THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JANUARY 31, 1895. CHICAGO, ILL. NUMBER 5.

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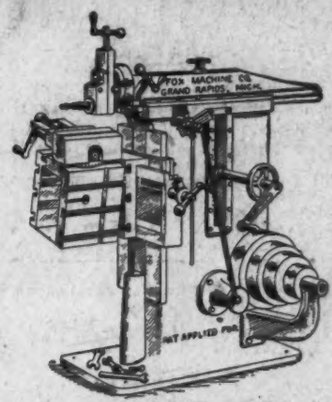

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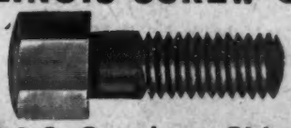

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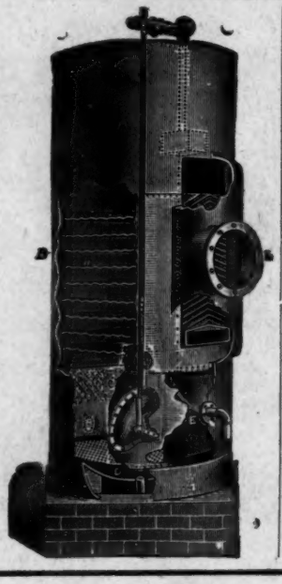

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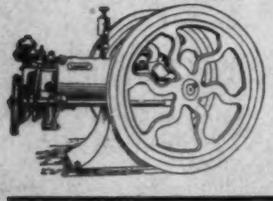

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. JANUARY 31, 1895. CHICAGO, ILL. NUMBER 5.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

There are evidences that the prolonged uncertainty in regard to financial legislation, poor railroad earnings and the further outflow of gold are holding back a number of projects that involve a large tonnage in iron and steel. The financial problem is in fact the largest element of uncertainty in the outlook for every industry. It is evident that the heavy buyers of Lake Superior iron ores are going to be in no hurry to make their arrangements for the next year's supply, preferring to wait until there are more definite indications as to the future basis of all values. While work on which contracts have been let has brought a certain amount of work to the mills, and there is promise of goodly tonnage a few months hence, there is a sharp struggle for orders that can be put in hand at once. Another contribution to the already large volume of structural material which is sure to be asked for, but is of no help to the market now, is made by the passage of the bill for Chicago's $4,000,000 postoffice building. Some further steel contracts for tall buildings in the East have been let in the past week. January business in nearly all lines has been below anticipations. Pig iron sales to mills and foundries have been small. As the year opened there was a call for iron by foundries that indicated enlarged consumption, but it appears to have been only a replenishment following the close reduction of all stocks at the close of '94. Prices for foundry iron are quite as weak as at holiday time, and some furnaces have gone below that level. Bessemer pig and billets hold the better prices noted last week, but neither buyer nor seller is forcing the situation. Eastern buyers of billets are holding off and will not entertain the $17.25 Philadelphia quotation. Sales of Bessemer pig are reported at $10 and $10.15, and of billets at $14.90, through Pittsburg brokers. From several Pittsburg mills there is a report of more encouraging business in the last week of January than in any other portion of the month. This is particularly true of products that find their final market through the hardware trade. Wrought iron pipe producers have come together on a 10 per cent advance, and conditions in that market are such that this can be maintained. Lake shipbuilding that has already furnished a good tonnage, promises further contracts in plates.

THE CLEVELAND OUTLOOK.

There seems to be no disposition on the part of ore buyers to enter the market, and meantime the arrangement among the producers of standard Bessemers still lacks one or two steps of formal completion. There has been very little disposition on the part of furnacemen to except to the course of the ore interest. Many furnacemen, from their connection with mining companies, have means of knowing the necessities of the situation, and to some of them the conservatism of the position taken has been a surprise. Some sales of ore on the docks have been made the past week in lots of from 5,000 to 15,000 tons, and the dock stocks of standard Bessemers, it is predicted, will be of small proportions at the opening of navigation. The late sales have been on the price basis proposed for 1895, but with an allowance made covering dock charge and taking into account the frozen condition of the ore. In the absence of any contracts for the coming season's ore, the discussion of lake freight has come to little but in view of the considerable additions being made to lake tonnage this winter, it is not expected that any figure above 75 cents would be considered for head-of-the-lake ore; it may result that a greater reduction will be made from the 80-cent basis of last year.

Pig Iron. Sales of Bessemer iron by valley furnaces for Pittsburg delivery are of small volume. Some metal has changed hands through brokers' offices and some trades of ore and pig iron have been negotiated. The present basis is $9.35 to $9.50 at valley furnace, the latter figure being minimum with some sellers. Others have piled iron and kept out of the market. The recent purchases of iron for delivery at Lorain, O., variously stated at from 50,000 to 70,000 tons, have been supplemented by a smelting arrangement with the Tuscarawas Furnace at Canal Dover, O., and when needed repairs are made its product will all be shipped to Lorain. The expectation of the management still is that the converting plant at Lorain will begin operations in April and the market is therefore counting on further purchasese of Bessemer for delivery in the second quarter of the years Foundry iron is weaker. Some sales from valley furnace. for delivery farther east have been made at figures palpably below cost. On deliveries nearer home the cutting has been less severe, but on this business the prices of a few weeks ago have been shaded. One sale of No 2 is reported at $9, valley furnace. No. 1 is selling at $10.75@ $10.90, Cleveland. Foundries are not taking iron on contracts as fast as had been looked for; many of them report that while considerable work is being figured on, the immediate demands on them are only moderate.

Finished Material. The shipbuilding contracts that have come up in this and other lake markets recently resulted in some record-breaking prices. The angles for the boat to be built by the Cleveland Shipbuilding Co. went to Chicago, and the plates (basic open-hearth) were taken in Cleveland. The channels went to Pittsburg. On beams and channels about $1 less per ton is being quoted, the present basis being 1.20c.@1.30c. Pittsburg, with nine cents per hundred additional to Cleveland. A new Cleveland block involving 1,000 tons of steel is about to be contracted for. In boiler steel, a good-sized contract in Western Ohio was let the past week, the material going to Pittsburg. The expected completion of the new plate mill of the Illinois Steel Co., at an early date, promises further close competition for Central Western work. On beams, channels and angles a new factor in the local market is the Cambria Iron Co., of Johnstown, which has made the Condit-Fuller Co., Cleveland agents for this material. In wrought pipe a new list has been sent out, taking effect Jan. 29, making considerable advances but the new discounts are not yet announced. The advance is said to average 10 per cent.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

The week has been quiet and uneventful in all branches of the iron and steel trade, and no large sales have been reported. Structural steel seems to be in the largest demand of any class, but even in this the only feature of interest are inquiries, and not sales. Crude iron is in light demand for immediate shipment, but there are good chances for the future, according to the largest sellers. In billets a single sale of any size is reported, and rods are very quiet. Merchant and sheet steel is in small demand.

PIG IRON.—The call for pig iron has been lighter in the past week, and sales have been only small. In local iron almost nothing has been done. There are still a good many buyers in the markets for large lots, but it is hardly likely that any of them will purchase for at least two or three weeks yet. Southern iron has sold rather better in the last week, and one sale of 500 tons is reported, at current quotations. Several deals are under consideration, and one of 500 and one of 1,000 tons will probably be closed up in the present week. Prices are about as last quoted, on both Northern and Southern irons, and it is not likely that any change will be made in the quotations for a few weeks at least. While sales are light, deliveries of both Northern and Southern irons are being called for as fast as the furnaces can make them, and this is about the most encouraging feature of the situation. Our quotations are as follows:

Lake Sup. Charcoal	$13 00@13 50	Southern No. 2 Soft	$10 00@10 25
Local Coke Fdy. No. 1	10 25@10 50	South'n Silveries No. 1	11 50@11 75
Local Coke Fdy. No. 2	9 75@10 00	South'n Silveries No. 2	11 25@11 50
Local Coke Fdy. No. 3	9 40@ 9 65	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1	10 25@10 50	Ohio Silveries No. 1	14 00@14 50
Local Scotch Fdy. No. 2	9 75@10 00	Ohio Silveries No. 2	13 00@13 50
Local Scotch Fdy. No. 3	9 50@ 9 75	Ohio Strong Softeners	12 50@13 00
South'n Coke No. 1	11 00@11 25	Alabama Car Wheel	17 50@18 00
South'n Coke No. 2	10 25@10 50	Malleable Bessemer	11 00@11 50
South'n Coke No. 3	10 00@10 25	Coke Bessemer	11 00@11 50
Southern No. 1 Soft	10 25@10 50		

BARS.—Several of the large railroad systems are reported as being in the market for cars, and one of them for 2,000 freight cars. So far, however, none of the contracts for cars have been closed. It is probable, however, that at least one or two of these car contracts will be placed within a week or two, and the sales of bars made for them. The 2,000-car contract will not be placed for several weeks yet. General bar trade is rather quiet, but still a good number of small orders are coming up every week, and last week was no exception. A few orders for from car-loads to 100 tons were placed. Prices on common bar are still made at 1.05c, but this is being shaded in a good many instances by mills anxious for business. Guaranteed iron is still quoted at 1.15c to 1.20c, and soft steel bars from strictly billet stock at 1.20c to 1.25c.

RAILS AND TRACK SUPPLIES.—Business has been very light, and only a few small orders have been taken. Some of the roads are in the market for quite large lots, but so far none of them have purchased. Quotations are still made as follows: rails, $23; splice bars, 1.25c to 1.30c; track bolts, 1.95c to 2c; spikes, 1.65c. to 1.70c.

BILLETS AND RODS.—The situation at Joliet is unchanged, and the billet mills there are still shut down. It is not possible to tell when they will be started up; not until the wage question is settled, certainly. The mill at South Chicago is running alternately on rails and billets, and enough are being made there to satisfy the wants of customers. A sale of 5,000 tons of billets was made last week, at $16.50, and this price will now be made on inquiries that carry preferred specifications, and are for large lots. Small lots are still selling at $17. Rods continue quiet, and no sales were made last week. Prices are continued at $23 to $23.50.

STRUCTURAL MATERIAL.—General business is as good as could be expected, and fair sales of small lots were made last week. The Northwestern elevated road has sent out specifications and asked for bids on six miles of elevated structure, which will amount to about 20,000 tons of material in all. It is not known when this contract will be let, but probably not for some weeks yet. A newly incorporated amusement company has announced its intention of building a structure which will require about 2,000 tons of material, and has asked for bids. It is not certain, however, that this scheme will carry. Prices are made as follows: Beams and channels, 1.45c to 1.50c; angles, 1.30c to 1.35c; plates, 1.40c to 1.45c; tees, 1.55c to 1.60c. Small lots from stock are quoted from ¼c to ½c higher.

PLATES.—Inquiries are only light, and only a small business has been done in the past week. Quotations are made: Tank steel, 1.35c to 1.40c; flange steel, 1.50c to 1.75c; firebox steel, 2c to 5c; boiler tubes, 75 per cent discount.

MERCHANT STEEL.—Business continues only fair, and sales made last week were rather lighter than the week before. It seems probable, however, that trade will be better in the next month. Quotations are unchanged: Open-hearth spring, tire and machinery steel, 1.65c to 1.70c; smooth finished tire and machinery, 1.50c. to 1.60c.; Bessemer bars 1.35c. to 1.40c.; tool steel, 5.50c to 7.50c.; specials, 11c. and upwards.

SHEETS.—A fair business has been done in black sheets, but galvanized have been very quiet. Prices are made: No. 27 common, 2.30c to 2.35c; steel sheets, 2.40 to 2.45c; galvanized, 75 and 10 per cent discount.

OLD RAILS AND WHEELS.—Old car wheels are still being held for $8.50 to $9, but some small sales were made last week at prices rather under the minimum figure. Old iron rails are quiet and nominal at $10.25 to $11, and old steel rails at $6.50 to $7 for short, and $8.75 to $9 for long lengths.

SCRAP.—Scrap is in very small demand, and prices are quite weak. Quotations are now made as follows: No. 1 forge, $8 to $8.50; No. 1 mill, $6.75; No. 1 machinery, $7; axles, $12.50; cast borings, $3.25; wrought turnings, $5.25; axle turnings, $6.25; mixed steel, $5; heavy cast, $7 to $7.50; stove plates, $5.25 to $5.50; heavy melting steel, $6 to $6.50.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. The past week has brought a better inquiry to some of the local mills than they had in the first three weeks of the month, and a more hopeful feeling is noticed in these quarters. Raw products are still in moderate demand, with perhaps a slight increase over the early portion of January. Bessemer pig iron has sold at a somewhat better price, $10.15 being now about the market. Valley iron is not offered to this market to any great extent. It is stated that $9.50 at valley furnace has been refused the past week, though it is known that considerable of this metal is lying in furnace yards. A considerable block of Bessemer is reported to have been sold by a valley furnace for valley consumption at $9.60. Mill and foundry irons show no signs of sharing in the better tone of Bessemer. They are selling slowly and in small lots, with No. 2 foundry at $10 and a shade less and gray forge at $9.15. Some recent sales of coke are reported at 90 cents, a sequel, it appears, of the failure of one operator to go into the agreement for an advance in price after the arrangement had been partly made.

Billets have held the slight advance noted a week ago. The mills are quite well sold up, and on the other hand the wants of most buyers are supplied for the next two or three months and the market is not likely to be an active one in the immediate future. In the recent slump of Bessemer pig and billets, makers of the latter have preserved a margin on conversion cost, low as prices have been, while it is apparent that some furnacemen, particularly in the valleys, have gone below cost. Orders for finished material the past week have included a number for railroad supplies. In structural material one large contract, that for the American Tract Society's tall building in New York, was taken by a local mill. Some plate contracts have come to Pittsburg, also, the competition, particularly on boiler plate, in territory west of Pittsburg, having included a maker well to the east of this market. The wire market has been active, and wire mills are running with full force. Wire nails are still on an 85c basis for large orders, with no likelihood that any agreement can be made to limit the heavy overproduction that is now finding an outlet at very low prices in foreign markets. Iron and steel bars are on the same low basis as heretofore. Production is somewhat larger. Steel tubing is in better demand and the mills are running to full capacity.

Cincinnati. Business has been without spirit or improvement since last report. While there are a good many inquiries out for both small and large lots of pig iron, orders are very slow in coming to a head. This characteristic seems to prevail all through manufacturing lines, so far as iron is concerned. Some of the largest consumers of iron state that if half of the work they are bidding on should be secured, they would have employment for many months ahead. The reason generally assigned for the hesitation and timidity shown is the currency muddle at Washington, and the apparent inability of the present Congress to deal with it. There is less employment for money than there was three months ago, and the temper of business men is universally to pay debts rather than to branch out in new undertakings. There is a strong probability that another 30 days will see a curtailment in the output of pig iron. Many furnacemen in the valleys, and other large producing centers, talk as though they would rather let their plants lie idle for a time than to work up cheap ores and coke into pig iron that is slow sale even at cost prices. One Southern manufacturer that has been a low seller in the markets for some years, passed into the hands of a receiver on Thursday. This makes no change, however, in the active furnace list, as the Rising Fawn and Chattanooga furnaces, operated by the company, are now idle. The furnaces in Tennessee and North Alabama that have been banked owing to unfavorable weather cutting off ore supply, are again running. In the Birmingham district, output is up to the full record. There is no change to note in prices, but the tone is not strong, and concessions are made on good sized orders for near-by deliveries.

Buffalo. There are still several large deals that have not yet been closed, but outside of these the market is dull. Prices show no tendency toward an early advance and in some sections are weak. The feeling among melters of iron is more hopeful than one would expect to find.

St. Louis. A slight improvement in demand has been noticed the past week. Several small orders, from 100 to 200 tons, are reported from local buyers. It is rumored that a large contract for railroad freight cars will be placed very soon by a Western road. A number of smaller contracts have already been closed.

FURTHER CUTTING IN CONNELLSVILLE COKE.

The estimated output of Connellsville coke ovens in the week ending Jan. 19 was 146,848 tons, a decrease of 3,222 tons from the preceding week. The 14,270 active ovens represent a falling off of 451 from the active list of the preceding week. Shipments were 7,947 cars—2,500 cars to Pittsburg and river tipples, 4,170 cars to points west of Pittsburg and 1,277 cars to points east of Connellsville. The falling off was 206 cars from the preceding week. The Connellsville *Courier* has the following on the recent cutting of prices on certain orders, which resulted from the failure of one operator to come into the agreement to advance prices Jan. 1:

The feature of the coke trade for the past two weeks has been a disposition on the part of some operators to cut the ruling rate on short contracts. The result is that the third largest producer in the region has been obliged to cut down his active list of ovens to about one-half what it was a few weeks ago. In order to secure these orders the price had to be shaded below the $1 mark, and it is probable that 90 cents a ton was the figure. This cut was a surprise to the consumers as well as to many of the operators. It has been generally conceded that prices had reached the bottom at $1 a ton and that it would only be a short time until there would be an advance of 25 or 50 cents a ton. The recent cut in one or two orders, however, is no indication that there will be a slashing of the prices on all sides again, as was the case just prior to the strike last year. The rate was shaded because in that way orders could be taken away from an operator who had refused to enter into an agreement by which the price of coke would have been raised the first of the year, or shortly afterward.

In speaking of the condition of the coke trade at present, a well known operator said yesterday: "The sooner the price of coke is raised to $1.50 per ton the better it will be for all parties concerned. The operators cannot afford to go through another year like 1894, selling their product below cost, and that is what they do when it is sold at 85 and 90 cents a ton. At $1 per ton there is no profit, and at only a few plants in the region does it cover the cost. The argument that the price of pig iron is too low to ask furnacemen to pay more for their coke at present is a shallow one. Let the operators once raise the price of coke and the furnacemen will soon adjust the price of pig iron to meet the increase. Of course there would be a falling off in coke production until the pig iron stocks would be decreased some, but the increase of 50 cents a ton on 100,000 tons of coke each week would more than make up for the loss of 50,000 tons weekly, caused by the advance."

Personal.

Geo. M. Sargent, of Chicago, president of the Sargent Co. and president of the Western Foundrymen's Association, spent a portion of the past week in Cleveland. The new Sargent brake shoe has met with prompt and gratifying demand from Western and Central-Western railroads, and the operation of the open-hearth department of the company's plant has been very satisfactory.

J. G. Butler, Jr., general manager of the Brier Hill Iron & Coal Co., Youngstown, met with an accident last week, the news of which will be heard with regret by a multitude of friends. A fall on the ice resulted in a bad fracture of the left leg. He will be kept to the house for some weeks.

Albert Fisher, of Fisher & Porter, Western sales agents for the Bethlehem Iron Co., with offices at Chicago, has spent a portion of the past week among Cleveland shipbuilding firms, bringing to their attention the steel forgings of the Bethlehem Co.

Horace V. Winchell, whose articles on the Mesabi range have appeared in *The Iron Trade Review* from time to time, has been favorably mentioned in connection with the office of inspector of mines, which a bill now before the Minnesota Legislature proposes to create. The duties of the inspector of mines would be to look after the safety of mine employes, to report on the development and outpnt of mines and quarries, and to report statistics of production for purposes of tax collection. The mineral interests of Minnesota are assuming greater importance every year, and the intelligent administration of the office proposed can be made of value to the State s well as to the mining industry.

THE IRON TRADE REVIEW

DEVOTED TO
IRON AND STEEL MANUFACTURE, FOUNDRY AND MACHINERY TRADES, IRON ORE PRODUCTION, TRANSPORTATION, AND GENERAL INDUSTRIAL PROGRESS.

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THE IRON TRADE REVIEW CO.,
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IT would seem that the next development in pig iron production will be the retirement of a number of furnaces from the active list. The pressure in the markets for foundry and forge, in particular, seems to be getting stronger with every week, and the crossing of the cost line has come more frequently.

THE contest between producers of acid open-hearth and basic open-hearth plates has developed fresh discussion on the reliability of the two processes, in connection with recent contracts at lake shipyards. Both sides have had their victories, and the campaign of education is being pushed with vigor among shipbuilding companies.

CINCINNATI manufacturers have been leaders in the movement to enlarge the market for American machinery in countries naturally tributary to the United States, and it was fitting that they should have the honor of bringing together among them all manufacturers interested in further extending the work just begun. In caring for the convention of last week, Cincinnati's industrial leaders proved the wisdom of putting the initiative upon them, and the choice of Cincinnati as the headquarters of the new organization was only proper recognition of the service of Messrs. Egan, Davis, Lane, Laidlaw and others in getting so important a movement well on its feet. The campaign for larger foreign trade, for speedier and more regular ship connections with our near neighbors, and for the rehabilitation of our merchant marine, has enlisted some of the solidest industrial leaders in the country, and it is a matter of congratulation that the planning and carrying on of the movement have been put in the hands of officers so aggressive and resourceful.

THE increase in the number of city agencies, by the large producers of finished steel, emphasizes the disposition on all hands to reach for business regardless of territorial bounds. Business in certain sections, naturally tributary to a given producing center and heretofore competed for by two or three concerns, is being sought now by a half dozen. The struggle is getting more determined as one economy after another is introduced to make a fresh cut on prices that have been considered absolute bottom. The push for tonnage that brought the low level of prices in the early months of 1894 has not been duplicated since, but there are indications that the desire to get back to the old output of some of the best equipped steel plants of the country is running in advance of the process of recovery. When the tariff uncertainty cut business down to the basis of mere restoration of wear and tear, manufacturers faced the inevitable and restricted production accordingly. Now that recovery is really in progress, there is impatience at the pace that bodes no good to prices.

IN our last issue figures were given showing the pig iron output of the nine Southern States—Maryland, Virginia, North Carolina, Alabama, Georgia, Texas, West Virginia, Kentucky and Tennessee—in 1894 and the preceding four years, in gross tons. The percentage of the country's pig iron production in each year was indicated, also, as follows:

	1894.	1893.	1892.	1891	1890.
Production by So. States.....	1,268 425	1,567,299	1,890,167	1,708,966	1,744,160
Per cent of total.....	19	22	20.6	20.6	19

In the above computation, the output of the Southern States is compared with the total production of pig iron —Bessemer, foundry and forge. With the increasing percentage of Bessemer iron produced in recent years, the tendency has been to minify the proportion of the South's contribution to the total. Leaving Bessemer iron out of the account and comparing the Southern production of foundry and forge, which is practically its entire output, with the total of foundry and forge, and the showing is as follows, in gross tons:

	1894.	1893.	1892.	1891.	1890.
Total foundry and forge..	2,848,821	3,555,904	4,712,959	4,807,680	5,110,360
Southern f'dry and forge.	1,182,440	1,320,053	1,619,885	1,506,594	1,489,740
Southern, per cent.....	41.5	37	34.4	31.3	29

The table shows that there has been a steady increase in the proportion of foundry and forge irons contributed by the Southern States in the five years in question.

NATIONAL INDUSTRIAL NEEDS.

Probably one of the ablest addresses before the manufacturers' convention at Cincinnati last week was that of M. E. Ingalls, the well known railroad executive, whose opinions on financial and commercial problems are the well digested reading and experience of a thorough man of affairs. We present some of his comments upon several questions that are to be uppermost in the work of the National Association of Manufacturers of the United States:

If I were asked to specify the particular things which were necessary in order to increase our trade with South America, I should mention two that are pre-eminent and above all others. First, you must have a standard of value or a unit of measure that is current in all the commercial countries of the world. Second, you must have regular and frequent communications with the various capitals of South America. A good thing would also be to adopt the suggestion I saw made in an Atlanta paper, that you arrange for an exposition in the City of Mexico. That is a start, and a good one, towards that country, and after that establish each year one in a South American capital.

Now, as to your standard of value: The commercial countries of Europe have established gold as their standard, and drafts which are drawn on London, or Paris, or Berlin, are paid in gold of a standard weight and fineness. No man questions that draft for an instant, whether he gets it in Chili, in Rio or Argentine. While we are really upon the same basis, yet owing to bad legislation, owing to the threats of the silver and greenback fanatics, and the Populists, foreigners are afraid that we will pass over the chasm and plunge into fiat money and free silver, and no one will take a draft to-day in Rio on New York for fear that when it gets there it will be

paid in a depreciated currency, and you have to give or take your drafts on London and pay the cost of exchange. This it was which disturbed England's trade with India so much that in 1893 she decided to stop the coinage of silver and take steps to put India upon a gold basis. While she is pushing ahead and establishing sound finance, we are dallying with free silver and fiat money.

It seems to me if the manufacturers of this country, as a body, would combine to establish agencies in South America; if they would push their business, and at the same time, through our representatives in Congress, urge the plan of subsidizing lines of steamships between our Eastern and Western ports and the ports of South America, we would obtain a foothold in this business, and in time drive out our competitors. There is nothing else, in my judgment, that will do it. Under the present circumstances the Englishman will undersell you every time. In the first place, he is a week nearer his customer than you are; just so much nearer as it takes to go from here to Liverpool. He has got his daily mail, while yours has to cross the Atlantic first; he has got a standard of value which is not questioned; he has got a Government that through its system of subsidies and its mail contracts, protects its steamship lines and insures rapid and certain transit between the countries. What can you do with your Government lukewarm or against you; with your representatives fighting over the question of debauching your standard of value, and repealing what little reciprocity trade you had with South America under the McKinley bill, and turning you out upon the cold world with no aid whatever to secure this trade?

Do not understand me, however, as thinking your case is hopeless, or as wishing to discourage you. I am only putting before you the difficulties of the situation and showing you what you must overcome before you can obtain success. I have had some little experience in this business. The friends of our Chesapeake and Ohio Railway were largely interested at one time in a line from New York to Rio, which called at Newport News. A large portion of its traffic was furnished by our railway, but they could get no encouragement from the U. S. Government, and, as I have stated earlier in my remarks, the line became financially bankrupt and was abandoned. Within the last year we have had up seriously the question of starting it again, but it has been impossible to obtain the necessary capital with the inducements that are held out; but if manufacturers like yourselves will organize and push this matter thoroughly you will be surprised to see how quickly the conditions will change. Our representatives in Congress, when they learn what the people want, are ready to obey their will, and when the great manufacturing interests of this country resolve upon any one thing, regardless of politics, and push for its accomplishment, they will get it. In union is your strength and the only hope of success, and if this meeting here in Cincinnati shall prove the commencement of such a union and such a success, it will indeed be one of the most memorable meetings that has ever been held in this country.

If you would allow me to suggest a platform for you convention, I would say three things: First, a commission of business men to readjust the tariff; second, the enactment of such laws as will give us a dollar current in any of the commercial markets of the world; third, mail routes established by the Government that will give us a mail to and from all the capitals of South America at least twice a month.

In the last days of December the scale of wages for the tonnage men of the billet department of the Illinois Steel Co., at Joliet, Ill., expired. The company proposed a 25 per cent cut, and this the men say they will fight to the bitter end. The company say the demand for billets is small, and the price has so decreased that in order to place their billets on the market in competition with other mills they must make a cut of 25 per cent on the tonnage men, and that when the mill is running full force they will draw good pay. There are about 40 tonnage men, and their refusal to accept the cut keeps 1,000 men out of work. The rod mill is running full.

John Adt, of New Haven, Conn., head of the firm of John Adt & Son, the well-known manufacturers of machinery, died Jan. 24, of pneumonia. Mr. Adt was born in Bavaria, and 25 years ago went to New Haven and engaged in the building of special machinery. He was widely and favorably known.

NATIONAL ASSOCIATION OF MANUFACTURERS.

The resolutions adopted by the National Convention of Manufacturers at Cincinnati, at the session of Wednesday, Jan. 23, were given in our last issue. They declared for the organization of a national association of manufacturers; for the retention of the home market by home manufacturers, and the extension of our foreign trade in every way not inconsistent with the possession of the home market; for the establishment of reciprocal trade relations between the United States and foreign countries; for a judicious system of subsidies looking to the restoration and extension of the American merchant marine; for the construction and operation of the Nicaragua Canal under the control of the Federal Government; for the extension of our natural and artificial waterways to the full needs of commerce, connecting the Great Lakes with the rivers of the Mississippi valley and with the Atlantic seaboard.

The constitution adopted on Thursday provides that the association shall consist of all National, State and local organizations of manufacturers and such associate members as a three-fourths vote of the executive committee shall elect. The officers consist of president, a vice-president from each State and Territory, a treasurer and a secretary. An annual convention is provided for, consisting of five delegates from each State and Territory, appointed by the vice-president from that State from nominations made by the manufacturers' organizations in his State. There is to be, also, an additional delegate for every $50,000,000 of manufactured product of each State and Territory. Each national organization of any industry, representing at least 60 per cent of the product of that industry, will also have one delegate. The executive committee consists of the president, secretary and treasurer and the vice-presidents from the 12 States producing the largest output of manufactured goods. The executive committee is to "exercise all powers necessary to promote the purposes of the association," but the annual convention elects officers, transacts any business it may determine, and may amend the constitution.

The headquarters of the association were established at Cincinnati, and the secretary and treasurer were elected from that city. Thos. Dolan, of Philadelphia, the well-known woolen manufacturer, Vice-President of the Cramp shipbuilding company, was made president. It would have been scarcely possible for the convention to hit upon a more representative or broader-minded captain of industry than Mr. Dolan. For treasurer, Robert Laidlaw, president of the Laidlaw-Dunn-Gordon Pump Co., Cincinnati, was unanimously elected. Mr. Laidlaw was one of the leading spirits in the organization of the association, and worked for the success of the convention with untiring energy. E. P. Wilson, of Cincinnati, secretary of the Manufacturers' Association, of Hamilton county, was elected secretary. The committee of seven on invitation and entertainment, to whose efforts the success of the convention was due in large measure, included the following well-known machinery manufacturers, whose firms are known throughout the country: Thos. P. Egan, president of the J. A. Fay & Egan Co.; Chas. Davis, president of the Lodge & Davis Machine Tool Co.; Robt. Laidlaw, president of the Laidlaw-Dunn-Gordon Co., and H. M. Lane, president of the Lane & Bodley Co.

The compromise scale has been signed by the Monongahela Tin Plate Co., of Pittsburg, which will start up in two weeks. The new tin plate mill was formerly the steel mill of the Oliver Iron & Steel Co., and has nine tin mills. Some of the mills will be started on Feb. 4. It is the intention of the company to add eight more tin mills, 17 in all, making the plant the largest in the United States. The nine mills now ready will employ about 500 skilled workmen besides laborers.

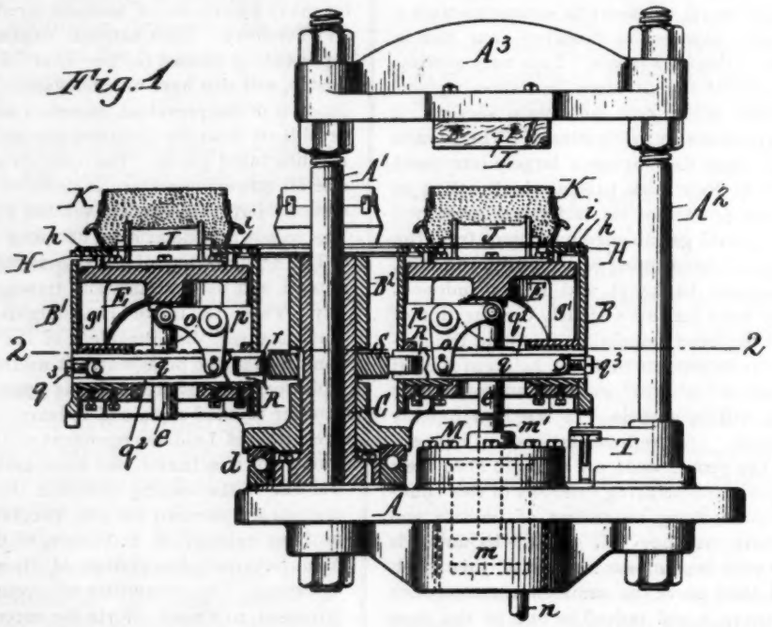
Contracts closed by lake ship builders within the past week bring the total number of new vessels on the stocks up to 33, having an aggregate value of $3,612,500. Seventeen of the vessels are freight carriers, most of them of the largest type, and their combined capacity on extreme draft is 51,450 gross tons.—[Marine Review, 24th.

The old Himrod furnace at Youngstown, abandoned in 1893, has been sold to H. K. Taylor and M. A. Norris, trustees. It will be dismantled.

RICHARDS MOLDING MACHINE.

A molding machine of the type which includes an abutment or stationary ramming block, a table or support for the flask to be rammed, arranged underneath the block, and a follower by which the flask is moved toward the block, for ramming the sand, has been brought out by Willard F. Richards, of Buffalo, N. Y. The flask support consists of a rotary table by which a number of flasks may be brought successively under the ramming block. The illustrations show in Fig. 1, a sectional elevation of the machine, with the followers in their normal positions; in Fig. 2, a horizontal section of the machine, in line 2—2 of Fig. 1; in Fig. 3, a sectional elevation of the machine, the section being taken at right angles to Fig. 1, and one of the followers being lowered to the position in which the pattern is stripped from the flask.

A is the stationary bed or base of the machine, and A' A^2 are two upright rods or standards secured at their lower ends to the bed and connected at their upper ends by a cross piece A^3. B is the horizontal flask-supporting table arranged to turn on the rod A' and consisting of a number of four upright, rectangular chambers or casings B'. These chambers are carried by a central hub or sleeve B^2 journaled on a fixed column C which surrounds the rod A'. The hub B^2 is supported upon the base of this column by a ball bearing *d*. A horizontal follower E is arranged to move vertically in each of the chambers B' and is provided on its under side with a depending actuating rod *e*. Each chamber B' is open at its upper end and provided in its lower end with an opening for the passage of the follower rod. The follower of each chamber is guided on upright bars or rails *g*, arranged in the corners of the chamber and fitting into angular guides *g'* extending downward from the four corners of the followers, as shown in Fig. 2.



H represents open rectangular supporting plates or frames resting upon pins *h* projecting above the upper edges of the chambers and *i* are the usual stripping plates secured to the upper sides of said supporting plates. J is one of the patterns which is secured to the upper side of the follower by any suitable fastening, and K is a half flask resting upon the stripping plate *i* and secured to the latter by any ordinary means. The stripping plates have the usual openings conforming to the contour of the patterns, through which the latter project into the flask. L represents the abutment or stationary ramming block secured to the under side of the cross piece A^3 and arranged directly over the circular path traversed by the chambers B', so that the several flask-supports may be successfully brought under the ramming block by turning the rotary table B.

M represents an upright actuating cylinder arranged below the table B. *m* is the piston arranged in this cylinder and *m'* its piston rod which passes upward through the stuffing box of the cylinder and has its upper end located in the circular path of travel on the rods of the several followers E, so that the lower end of any one of the follower rods may be brought directly opposite or in line with the upper end of said piston rod, as shown in Fig. 1, in which position the upward movement of the piston rod is imparted to the follower rod standing above it. The piston of the actuating cylinder may be operated by steam or compressed air which is delivered to the cylinder by a pipe *n*.

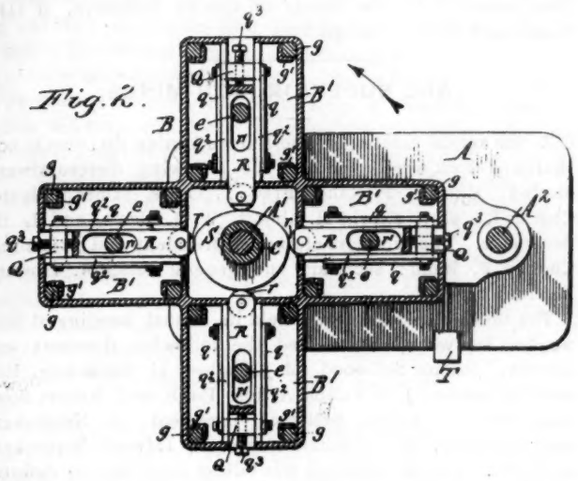
Omitting other details of construction which are not essential to this description, we pass to the method of operation:

The rotary table is locked in place, after bringing one of the followers under the ramming block, by any suitable means. A spring catch operated by a treadle T is preferably employed for this purpose. When the rotary table is turned so that one of the followers E stands under the ramming block the slide R co-operating with the follower is its outermost position and the follower is sustained in the position shown in Fig. 1, being nearly flush with the upper edge of its chamber. The pattern secured to the follower projects through the opening in the stripping plate and the supporting plate of the latter and the half flask rests upon the stripping plate, having been previously filled with sand, in the usual manner. Upon admitting steam to the actuating cylinder, the piston in the latter rises and strikes the lower end of the follower rod, moving the follower, together with the superposed supporting frame, the stripping plate and the flask, toward the ramming block, thereby forcing the sand in the flask against the ramming block and packing it around the pattern. Upon allowing the steam to exhaust from the actuating cylinder, the follower with the superposed parts descends to the position shown in Fig. 1, when its further descent is prevented by the upper arms of the elbow levers *o*. In this position of the parts, the frame which supports the stripping plate and half flask rests upon the pins *h*. The rotary table is now unlocked and given a quarter turn in the direction of the arrow in Fig. 2, so as to bring the partially lowered follower on the rear side of the machine and the next follower under the ramming block. This quarter turn of the table brings the slide of the follower opposite the narrow portion of the cam S, allowing the latter to move inward and the follower with the pattern attached thereto to descend to its lowermost position as shown in the right hand portion of Fig. 3, thereby withdrawing the pattern from the flask and completing the half mold. The depressed follower remains in this position until the rotary table is again shifted for presenting another unrammed flask to the ramming block, when it is again raised to its normal position by its slide riding over the wide portion of the cam S and swinging the bell crank levers into the position shown in Fig. 1. The flasks on the several followers are in this manner successively presented to the ramming block and rammed, and are then moved aside for withdrawing the pattern from the mold. Each follower may be provided with a single bell crank lever *o*, but a pair of levers with each follower will better equalize the strain.

By the employment of the follower-retarding devices, the sudden and forcible descent of the followers with breakage of the mold is obviated, and the movements of the followers required for stripping the patterns from the flasks and again raising the followers to receive a new flask, are performed in the act of turning the rotary table.

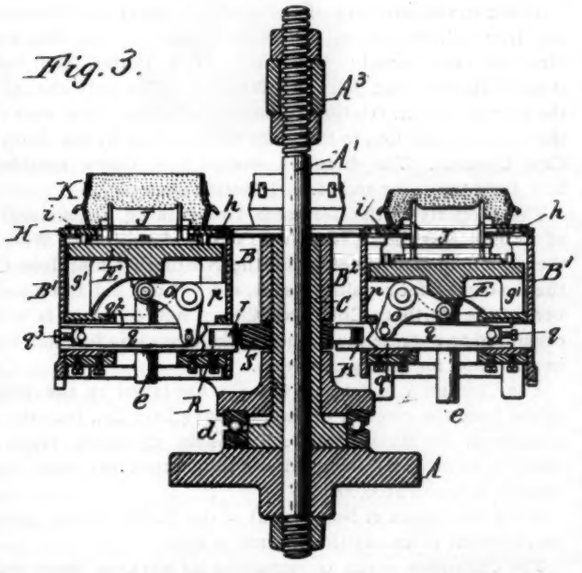
The capacity of these machines, the designer states, is only limited by the time required in placing and removing flasks.

Fig. 2.



If the machines are operated by four men, one man would operate the main pressure valve for ramming, and the foot lever for locking the table; one man would be required at the rear of the machine for removing the completed mold; one at the side to place the empty flasks on the platen, and one to fill with sand the flask already on the platen. It is claimed that these machines are simple and effective, not liable to get out of order, easy to operate, and with capacity only limited by facilities for handling the material to and from the machines.

Fig. 3.



The machine here illustrated is designed for the lighter class of work, and withdraw of patterns to four inches. The address of Mr. Richards is 194 Herkimer st., Buffalo.

GENERAL LORD WOLSELEY makes an important contribution to the literature of the China-Japan war. In an article for the February *Cosmopolitan*, he discusses the situation and does not mince matters in saying what China must do in this emergency. Emile Ollivier tells the story of the fall of Louis Philippe. From every part of the world, drawings and photographs have been obtained of the instruments used to torture poor humanity, and appear as illustrations for an article by Julian Hawthorne entitled "Salvation via the Rack."

NOTHING definite was decided on at the meeting of the Girard (O.) Stove & Foundry Co., Jan. 25, to consider the question of removing the works. The stove plant will probably stay where it is, for the present, at least.

METHOD OF CASTING CHILLED ROLLS.

Hermann Reusch, a mining engineer, of Senbach, Austria-Hungary, and Bernard Preu, engineer, of Goerlitz, Silesia, have patented, in the United States as well as in a number of European countries, a process for casting steel rolls. The method generally pursued admits the metal through one or more runners at the lower journal end of the mold, the latter being in a vertical position and allowing the metal to rise therein to the dead-head portion. This often presents serious difficulties.

As the metal ascends along the cold surfaces of the mold it cools gradually, so that on reaching the dead-head portion it will rapidly congeal, thereby imprisoning the gases and even dross in the more fluid portion of the mass of metal, resulting in a product that is more or less porous, especially about the upper journal. To avoid this it has been the custom to extend the dead-head portion of the mold considerably above the

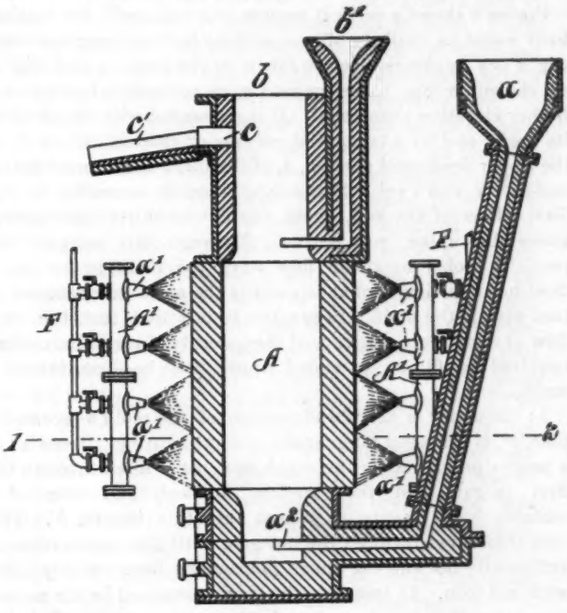


Fig 1

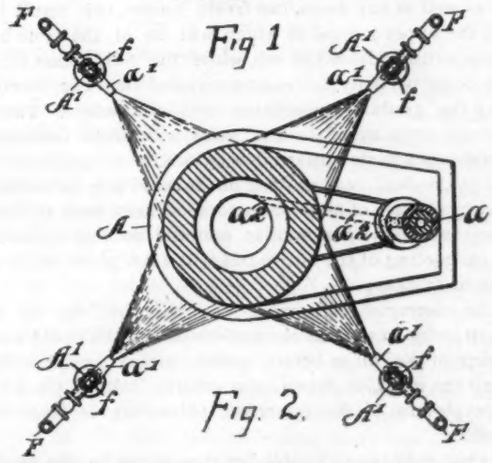


Fig. 2.

upper journal in order to afford space for a greater mass of metal to collect above the upper journal. But in this case the ferrostatic pressure of the more fluid portion of the metal is correspondingly increased, and as the mold, when it becomes heated, expands more or less, while that portion of the metal in contact with the surfaces of the mold cools and contracts, a space is left between the thin outer shell of congealed metal and the inner surfaces of the mold, which under the increased ferrostatic pressure is liable to be ruptured, so that the cast roll will have a longitudinally fissured outer face, and is consequently worthless in more cases. This inner ferrostatic pressure is further increased, especially when a harder and more contractile metal is used, by the imprisoned gases, owing to the rapid cooling of the dead-head, which renders their escape impossible. In casting very large and long rolls the outflow of the metal must be very long continued, by reason of the greater cooling action of the larger mass of the mold, in order that the metal having passed through the entire length

of the mold shall reach the upper dead-head still heated enough to remain fluid, until no danger exists of the hard metal roll becoming fissured. But a very long outflow is costly and causes the mold to become too highly heated and expanded, and, finally, the metal poured in becomes welded to the under part of the mold, which renders both the mold and the roll useless.

The object of the method which we illustrate is to provide means whereby these difficulties are overcome. For this purpose an in-gate is arranged at the lower end of the mold and a second in-gate at the upper or dead-head portion of the mold, causing the molten metal to flow into the mold at or near both ends and through the mold in the same direction. Means for abstracting the heat from the mold are provided, thereby preventing it from unduly expanding, such means consisting of atomizing or spraying devices for atomizing or spraying a cooling agent and projecting it in a finely divided or sprayed condition upon the outer surfaces of the mold.

Figure 1 shows a vertical section of a roll mold for casting hard metal or chilled rolls according to the invention, and Fig. 2 is a transverse section taken on the line 1—2 of Fig 1. As shown in Fig. 1, the in-gate *a*, is preferably located at a higher elevation than usual. It is connected with the mold at its lower end by a tangential passage or channel, a^2, and at the upper dead-head portion, *b*, of the mold A, are provided an out-gate, *c*, and a suitable runner *c'*, located according to the dimensions of the roll, about twenty or thirty centimeters above the upper roll journal. Through this out-gate the partially cooled metal can flow until the metal in the upper dead-head portion is of substantially the same temperature as that within the mold. In practice it is found that the out-flow of metal need not exceed the quantity of metal heretofore required to fill an extended upper dead-head portion of a mold.

At the upper or dead-head portion of the mold a second in-gate, *b'*, is arranged tangentially communicating therewith at a proper point. After the mold has been filled through the first in-gate, and the out-flow finished, hot iron of a suitable hard quality is poured into this in-gate. *b'*. This iron then flows through the out-gate until the metal runs off sufficiently hot and the upper journal has been entirely filled with hot iron. In this way, the gases contained in the molten mass as well as any dross, can freely escape, the result being a roll, the upper journal of which will be of the same homogeneity as the body of the roll, while the fluid mass inclosed in the outer partially cooled or congealed shell can freely rise during the gradual congelation and contraction. Thus the ferrostatic pressure of the fluid mass will not be increased by any resistance to its upward flow, while the congelation of the metal in the dead-head portion of the mold may be further retarded by the use of non-conductors of heat, such as charcoal or charcoal dust, or a similar material, so that a practically uniform cooling of the entire roll will take place without fissuring or cracking.

In the casting of rolls, more especially of large or heavy rolls, in order to prevent the expansion of the mold and the fissuring of the roll as before stated, means are provided for cooling the mold, as shown, the cooling taking place before the completion of the operation of casting or immediately thereafter.

It is not only impracticable but dangerous to the workmen to effect the cooling of the mold by means of water applied directly to the mold, and this would also require special arrangements for each mold, while the use of a gaseous cooling agent, such as air, is insufficient, especially in the cooling of the molds for the larger rolls.

In order to effect a uniform and comparatively rapid cooling of the mold, atomizers or spraying devices are provided whereby atomized water is projected upon the mold. The water is immediately vaporized or converted into steam, whereby the heat is rapidly taken up and the mold cooled without danger to the attendants.

F indicates the compressed air supply pipes that are provided with a number of atomizing nozzles, *f*, and A' the water supply pipes provided with a corresponding number of ejector nozzles *a'* into which extend the atomizing nozzles *f*. In Fig. 2 are shown four atomizers or spraying devices disposed around the mold, and provided with such a number of atomizing or spraying nozzles as to apply the atomized cooling agent over the entire surface of the mold intermediate of the journals.

A special feature of this process is the saving of the casting mold, especially of the core in the case of hollow castings, by the use of the second in-gate in the upper part, whereby the time of casting at the bottom and the consequent local heating is shortened as much as possible. Thus the core is kept intact, which is the first condition for the success of a hollow casting. The process is in the hands of Gustav Baumann, of 1417 Monadnock Block, Chicago.

LAKE SUPERIOR IRON MINES.

At the annual meeting of the Aurora Mining Co., over 90,000 shares of stock were voted and the following directors were elected: Charles F. Rand, Fred T. Gates, James Colgate, Charles L. Colby, Edwin H. Abbott, W. J. Olcott, and L. H. Severance. The directors elected as president and treasurer, Charles F. Rand; secretary and general solicitor, Howard Morris.

The Brotherton Mining Co. held its annual meeting at Milwaukee, last week, and elected the following directors and officers: Joseph Sellwood, M. J. Luther, H. Neidecken, Edward Neidecken, J. B Tubbs, Arthur Pugh and Robert Bowden, directors; Joseph Sellwood, president; H. Neidecken, vice-president; M. J. Luther, treasurer; Edward Neidecken, secretary. The ore situation was talked over, but no definite arrangements looking toward resumption were decided upon. The Brotherton shipments last year were all from stockpile.

The annual meeting of the Cleveland-Cliffs Iron Co. was held at the company headquarters in the Mercantile Bank building, Cleveland, Jan. 23. J. H. Wade, W. G. Mather, J. H. McBride, E. R. Perkins, T. P. Handy, Amos Townsend, James H. Hoyt, Samuel Mather, and Peter White were chosen directors, all being re-elected. As a quorum of the board was not present in the city, the organization of the board of 1895 was postponed for a few days.

At the annual meeting of the stockholders of the Metropolitan Iron & Land Co., at Milwaukee, Jan. 18, the following directors were elected: S. S. Curry, O. W. Potter, L. J. Petit, Francis Hinton and John A. Whaling. The only change is the election of Mr. Hinton, manager of the Bay View works of the Illinois Steel Co., to the place made vacant by the death of Capt. Clement. The directors elected S. S. Curry president, L. J. Petit treasurer and H. S. Haselton secretary.

The property of the Germania Iron Mining Co., consisting of mining machinery, lease, etc., was sold at Hurley, Wis., by the sheriff to satisfy a claim of the Northern Chief Iron Co., the fee-owner, for royalties, taxes, etc. It was bid in by members of the Northern Chief Iron Co. A new company is being organized to operate the property, the Germania has not been in operation for nearly two years.

The Chicago & Minnesota Ore Co. has taken up the option it had from the receiver of the Pittsburg Iron Co., Duluth, on a mine on the Mesabi Range, Township 58, north, range 17 west, 55 forties, and the deed was transferred last week, for a consideration of $100,000.

Work has begun at No. 6 shaft of the Tilden mine, giving employment to an additional force of men.

The Champion mine is increasing its working force daily, having put men to work in Nos. 3 and 4 shafts, and will resume work in the other shafts as soon as the water is pumped out.

Work has been resumed at the Biwabik mine, and from 100 to 150 men are employed, day and night shifts being run. This winter the east bank of the east cut will be stripped.

At the Tower mines of the Minnesota Iron Co., 700 men are at work, and about the same force at the Chandler, at Ely. The Pioneer mine, also at Ely, now has 120 men employed.

THE Boston *Commercial-Bulletin* signalizes the opening of its 37th year by issuing a double number printed on book paper from a new dress of type, an illustrated cover giving pictorial prominence to the interests the paper has so long and so well represented. Industry, business, finance, insurance, all find the *Commercial-Bulletin* an able and progressive exponent.

SOME reductions in the wages of tonnage men have been made by the Cambria Iron Co., taking effect Feb. 1.

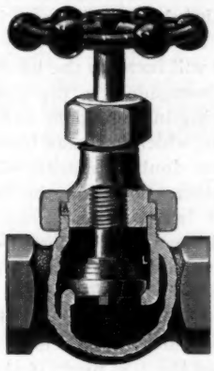
LUNKENHEIMER'S REGRINDING VALVE.

A sectional view is given below of Lunkenheimer's regrinding globe valve, which possesses several features of merit. Instead of the hub being threaded direct to the body of the valve, it is merely fitted into it plain and rests upon a flange which fits upon the upper edge of the opening, as is shown in the cut. The hub is then secured by a nut which fits over the flange and is threaded to the outside of the body of the valve. By this arrangement it is possible to have the valve reground at any time. All that is necessary is to loosen the nut, remove the hub, place a little sand and soap under the disk, and then replace the hub, leaving the nut loose so that the hub is free to turn with the stem during the regrinding.

A piece of wire or nail is passed through a hole provided for this purpose in the lower end of the stem of the disk, so that the disk will turn with the stem during the regrinding, which of course it does not necessarily do when the stem is in use.

The hub being in place when the grinding is done, effectually centers the stem and holds it in proper place, so that the regrinding is done correctly. The valve can thus be readily ground while in position, and in many cases this does away with the necessity for breaking connections. The disk is also of course easily replaced when required. These valves, having an outside thread and union connection for holding the hub to the valve shell, are always easily taken apart, as the hub will not "cement" into the shell, as is the case with all other makes.

These valves are made of gun metal throughout, are tested and inspected before leaving the works, and as a proof of their merit it is stated that they are extensively used in rolling



mills, refineries, on locomotives, steamships, and in the United States Navy on cruisers, where the requirements are very severe. They are made by the Lunkenheimer Co., Cincinnati, O., who will be pleased to hear from any in the trade. They have catalogues on brass goods for steam, which they will send to any address.

Integrity of Machinery Steel.

In the forced draft trials of modern high-speed vessels and the terrific strains endured by the several members of the engines, no one seemed to have remarked upon the extraordinary integrity of the material composing them. This is in all cases machinery steel, and its endurance under the work done is sufficiently remarkable to warrant comment. Modern machinery steel of greater or less carbonization bears a certain stress in the testing machine, but this stress is in no degree comparable with the work demanded of steel under the crucial test of a forced draft trial. Then it is yank, jerk and jar without end, each strain alternating, even combining with the other, and the whole kept up for hours at the very highest tension steam is able to put upon it. It almost seems at times as though upon the reciprocating parts that the heads would be jerked off of the bolts, and that no material could stand the usage that modern steel gets. With all this the details are not heavy and clumsy, they are the reverse of this, being even lighter than they were many years ago. The fact of the matter is, that, in addition to excellence of material in the beginning, the systems of inspection and thorough working that steel receives in modern forges, leave no flaw undetected. Breakdowns are very rare indeed, in comparison with the number of engines in use, which fact justifies our conclusions. —[Engineer.

RAILROAD EARNINGS ANALYZED.

The analysis of railroad figures for 1894 and 1893 has been a prolific theme in journals devoted to securities of various descriptions and to finance in general. The *Railroad Gazette's* condensation of the *Financial Chronicle's* review of gross earnings of the railroads of the United States in 1894 brings out the salient points:

Returns from 125 roads for the full year, and 69 roads for 11 months, showed a falling off of about $112,500,000; but this statement did not include a good many roads that are known to have lost heavily, and the probability seems to be that reports from the total mileage of the country will show a decline of $130,000,000. But even this is not the worst, for this decline follows a heavy one in 1893, when the decrease must have been something like $30,000,000, or say $160,000,000 in the two years. But this loss followed a steady increase which in 1892 was about $45,000,000; in 1891, $44,000,000, and in 1890, $70,500,000. The decrease per cent in 1894 was 11½ and in 1893 it was three per cent. It will be remembered, however, that the loss in the first half of the year was very much greater than 11 per cent, having been 21.48 in June and 20.49 in July. There was but one month in the year, August, namely, which showed an increase in gross earnings over the corresponding month of the year before; of the other months December had the smallest loss. Of course the immediate causes of this showing are familiar. The general hard times is the first and greatest; but the labor troubles were unusual, beginning with the great coal strike in the spring, accompanied by the disturbances created by the Coxey tramps, and followed in July by the Pullman strike, in which earnings on some great lines practically ceased. Then there were serious and unusual floods, considerable demoralization of rates, short crops and low prices. The corn crop was the smallest in over 10 years, and the seaboard receipts of grain fell off enormously. In 1894 they were less than 154,750,000 bushels, in 1893 they were 211,500,000, in 1892, 277,333,333, and in 1891, 233,500,000. The grain receipts at Chicago were about 54,000,000 bushels less than in 1893, and 60,000,000 less than in 1892. Provision receipts, however, were generally greater. The cotton movement, notwithstanding the unexampled low prices, was considerably above the normal which helped out the Southern and Southwestern roads. Nearly 1,250,000 bales more cotton were received at the Southern ports in 1894 than in 1893, most of the gain being in the last three months of the year.

New Lake Steamers Exceed Those in Coastwise Trade.

With the placing of contracts for steel steamers of over 400 feet in length at lake shipyards the comparison between lake and coastwise tonnage becomes more clearly defined. A special from the seaboard states that the contract for building a steel steamship which will be one of the largest vessels engaged in the coastwise trade, has been awarded by William P. Clyde & Co. to Cramp & Co., of Philadelphia. The new steamer will be of 3,500 tons register, 325 feet long, 46 feet beam, and 30 feet depth of hold. She will be driven by engines of the quadruple expansion type, working with steam at 200 pounds pressure. She will have accommodations for 150 passengers and her freight handling appliances will be of the best modern pattern. Given the same draft of water and an easy 6,000 tons would be carried regularly in the late tonnage contracted for on the lakes, besides which, there are several 5,000 ton craft now afloat if any draft more than ballast trim could be secured for lake transportation.—[Marine Record.

THE employes of the Blairsville (Pa.) Tin Plate Co. rejected the offer of the company to pay the compromise scale of wages without signing the scale. A similar offer made by the Ellwood Tin Plate Co., of Ellwood City, Pa., was rejected. A dispatch from New Castle, Pa., says that the laborers employed there, who have earned $2 and less will be compelled to stand a considerable reduction, owing to the failure of the manufacturers to secure the needed reduction in the wages of high-priced men.

THE Ohio Steel Co.'s plant at Youngstown, O., started this week. The preliminary operation of the blooming mill has been satisfactory.

WESTERN FOUNDRYMEN'S ASSOCIATION.

The regular monthly meeting of the Western Foundrymen's Association was held on Wednesday evening, Jan. 23, at the Great Northern Hotel, Chicago. In the absence of the president and vice-president, the meeting was called to order by the secretary, and Mr. John T. Rowlands was nominated and elected temporary chairman.

Owing to the inclemency of the weather, the attendance was comparatively small. Those present were: A. M. Thompson, Link-Belt Machinery Co., Chicago; A. W. McArthur, Rockford Foundry Co., Rockford, Ill.; J. Vrooman, Bloomington Stove Works, Bloomington, Ill.; M. N. McLaren, E. P. Allis Co., Milwaukee; E. J. Fowler, Fowler Foundry Co., Chicago; H. S. Vrooman, Garden City Sand Co., Chicago; W. L. Lukens, O. T. Stantial, Illinois Malleable Iron Co., Chicago; A. D. Edwards, Illinois Iron & Bolt Co., Carpentersville, Ill.; D. L. Cobb, Sloss Iron & Steel Co., Chicago; W. T. Warner, Illinois Central shops, Chicago; E. H. Walker, Emerson, Talcott & Co., Rockford, Ill.; S. T. Johnston, Whiting Foundry Equipment Co., Harvey, Ill.; A. Sorge, Fraser & Chalmers, Chicago; John T. Rowlands, J. I. Case Threshing Machine Co., Racine, Wis.; W. C. Waterbury, Forster, Hawes & Co., Chicago; D. L. De LaFontaine, Crane Co., Chicago; John W. Hughes, Link-Belt Machinery Co., Chicago; B. M. Gardner, *The Iron Trade Review*, Chicago.

The paper for the evening was read as follows:

The Effects of Different Elements on Cast Iron.

BY CHAS. JOHNSON, SUPT. OF HOWE SCALE CO., RUTLAND, VT.

It is the general opinion of writers on science and progress that never was there a time when so much study and labor were given to the elementary principles of mechanical construction as at the present, or as great improvements made in all processes for the production of finished goods from the raw material. The methods of producing iron and steel have been so much improved, and the cost of producing so much lessened, that it is astonishing to note the difference between the cost of producing iron and steel at the present and that of producing it by the methods of 50 years ago Nearly every day we hear of some new and wonderful achievement by mechanics or scientific workers in their various fields of experiment and research. The writer is a practical molder and melter, and has made a study of the analysis of irons and the effect of various elements upon castings. Carbons, silicons and sulphur are very much changed by pressure and the amount of air or oxygen in the cupola. It is sufficient to say that nearly all of the phosphorus entering the cupola is found in the iron; its effect is to make the iron cold short. The percen age of silicon is controlled by the temperature in the zone of combustion. Carbon combines with iron as the oxygen leaves it. Carbon exists in pig iron as graphitic and combined, and the relative proportion of each will largely control the grade.

There is a suitable proportion for each constituent present in cast iron; this proportion depends upon the character of the product which is desired and upon the proportion of other elements present. Variations in the proportion of silicon afford a trustworthy and inexpensive means of producing a cast iron of any required mechanical character. Carbon affects the color, strength, hardness and fusibility of cast iron. It exists in pig iron in two distinct forms, the combined and graphitic or free carbon, and upon the relative proportion of each in a great measure depends the character of the metal. Graphitic carbon occurs almost exclusively in gray pig iron (foundry irons) in the form of dark thin flakes varying much in size and intersecting the small particles of iron. Its influence is to make iron softer and tougher, but weaker and less tenacious than if it existed in the form of combined carbon. The strength of cast iron depends upon, first, the amount of weakening impurities present, and second, the proportion existing between the combined and the graphitic carbon. The tendency of combined carbon is to increase hardness and brittleness, and that of graphitic to make the iron soft, malleable and tough. Too much of either form is a disadvantage. The writer will show that by the judicious use of silicon this proportion can be regulated. An increase of silicon will change combined carbon to graphitic, and when the founder understands its use he may soften and toughen or harden and strengthen his iron to suit his requirements. The free use of silicon without first understanding the amount needed is sure to get the foundryman into trouble; for in iron where the carbon is already graphitic, more silicon may weaken it and make it brittle. Silicon increases the fusibility and fluidity of iron, lessens the formation of blow holes, and reduces shrinkage. The percentages of manganese, phosphorus and sulphur must be known to regulate the proper proportion of silicon, and only by great care and attention to the composition of his mixture can the foundryman expect to overcome the difficulties that occur daily in the melting of pig iron.

The effect of phosphorus upon iron is to cause it to be "cold short"; that is, brittle when cold. Phosphorus probably has little effect upon the tensile strength under gently applied loads, but phosphoric iron is readily broken by jerky, shock-like, or vibratory stresses. It is treacherous; it sometime affects iron but slightly. Unless great fluidity is desired and strength is not a consideration, the percentage of phos phorus in pig iron for foundry work should be .7 and less. Phosphorus is not an unmixed evil, however, and when present in quantities ranging from .8 and less it has some beneficial effects; for while it cannot be said that it really makes iron more fluid, it prolongs the period of fluidity. Its tendency is to render the metal very limpid, so that it will take an extremely fine and sharp casting from the most delicate pattern. It also is a lessener of shrinkage, and does not affect carbon; and high phosphoric irons have low shrinkage.

Manganese is seldom absent from pig iron. It is easily removed from iron by oxidation, being oxidized by silicon. The presence of manganese increases the power of carbon to combine with iron at high temperature. It assists in the prevention of blow holes. It removes sulphur from cast iron, and increases the shrinkage. Hardness is another important consideration with the foundryman. An increase of one per cent. of manganese will increase the hardness 40 per cent. A great per cent. of manganese in pig iron will escape in the slag during re-melting in the cupola, and benefits the iron by carrying off sulphur, which has been brought in with the fuel.

Sulphur is without doubt the worst element found in pig iron. The other elements all may be beneficial for certain purposes. Sulphur is the enemy dreaded by all; it causes iron to be what is known as "red short"—that is brittle when hot. It makes iron hard and white, causing it to retain its carbon in the combined state. It makes the iron thick and sluggish when molten, and gives rise to blow holes during its solidification. For this reason close attention should be given the analysis of the fuel used. Coke with the sulphur over .075 per cent. is not fit for foundry purposes. Silicon expels sulphur from iron to a certain limited extent.

The elements of which I have given a brief description have been practically demonstrated as to their effect by the writer. Our work in the foundry is such that in order to prevent a great loss it is necessary to have very soft and strong castings with a shrinkage not very much over 1-100 of one inch. Our test bars are much stronger than any I have so far known of. It will be readily seen by noting the different effects the above elements have on castings how necessary it is to know just what the analysis is of the iron before melting, and that there must be a certain per cent. of each element in the casting to produce the best result.

The present mode of selling pig iron is by the appearance of the fracture of the pig metal when broken; and the variation of the grading in different sections of the country will always be confusing, and must soon lead to the sale and purchase of pig iron by analysis. The carbon in pig iron is what enables the eye to distinguish the different grades. The softest, grayest iron having almost all the carbon in the graphitic or uncombined state, while the hard and white irons have it nearly or wholly combined. Iron depends upon the relative proportions of these two forms of carbon, varied, of course, by the influence of silicon, sulphur, manganese and phosphorus, which are always present to a greater or less extent. In grading pig iron by the fracture how confusing and unsatisfactory this system is. This custom of grading has been in vogue so long that many have grown to think it is the only way to determine the character of the iron. But while the eye is a fair guide in fixing the grade, it is not possible to tell the percentage of the impurities in the iron from the appearance of the fracture; consequently the system is deceptive. On the other

hand, if iron is graded by analysis the amount of the percentages is determined accurately; and if the effects of these elements are known, the foundrymen is enabled to select only such iron as will benefit his mixture.

I do not believe any property of iron can be determined by its fracture except the condition of the carbon—whether it be in the graphitic or combined state. Sulphur and phosphorus and even manganese could be present in such quantitities as to injure the iron for many uses, and yet there is nothing in the fracture to indicate it. Since, then, these injurious elements, which so greatly affect the quality or character of the product, cannot be detected by the appearance of the fracture, why insist upon a system in vogue hundred of years ago? Using the iron without knowing the elements it contains will many times cause inferior castings and heavy losses. All foundrymen know that fracture cannot always be relied upon, and that, frequently, iron graded under the present system as No. 3 foundry will run as soft on re-melting as No. 1; but no foundryman could be persuaded to accept it for No. 1 from appearance of fracture. The writer has, by knowing the analysis of No. 3 iron, made as soft and strong castings from No. 3 pig iron as could be made from any No. 1 iron. It will be seen, therefore, that no one can tell how pig iron is going to melt from the appearance of the fracture of the pig iron.

Among the founders, however, little attention has been paid to the chemistry of iron; but when they have once seen the great advantage to them of this basis of grading, I do not hesitate to say that iron will be purchased on no other basis than that of analysis. With the knowledge on the part of the founder of the effect of the elements on his mixture will come the demand for iron having a guaranteed percentage of certain elements for the required work.

The writer feels that the time is not far distant when all iron must be sold on the basis of analysis. It means common language for both producer and consumer in discussing the qualities or characteristics of an iron. The founder having obtained a mixture suited to his purpose, and knowing its constituents, has only to indicate his necessities to have his order filled with a degree of satisfaction not known or possible under the present system; because in the matter of fracture no two furnaces grade exactly alike, and, as previously stated, the iron may run much softer or harder than the grade under which the fracture would indicate it should be classed. By analysis the grading can be guaranteed, and only in this way can perfect uniformity be attained.

The writer's experience and investigations do not warrant the laying down of any rules or suggesting any formulas that would bring about this result. The character of work differs so much in foundries that what would be suitable for one might not be for another; and while the mixture would answer several purposes, in the one case it might be an economical one and in the other a very expensive mixture. It is certain that the foundryman who is ignorant of the ingredients of his mixture cannot hope to accomplish much in the direction of cheapening his product. We do not look for a composition in literature from a man ignorant of the alphabet, or a fine painting from one who does not know how to draw or mix his colors. No more can we expect the best material at the minimum cost from a man that is not master of his tools, which, with the foundryman, are the constituents of his mixture.

The foundryman may think the quantities of injurious elements are so small that they cannot affect much either way the quality of his castings. We need only to point him to the very small quantity of plumbago (carbon) that will change iron into steel, as the best evidence of how profoundly certain elements affect the properties of metals. Such changes may cause the material to be very useful or entirely worthless. The writer would advise the foundryman to study his requirements; to learn for himself what elements he needs to give strength, softness, fluidity, etc., to his iron. He will then not be dependent upon the salesman with a mixture, who, to make a sale, will cause him to try iron not suitable to his necessities, often resulting in the loss of hundreds of dollars. A little knowledge on the part of the foundryman will enable him to avoid all this, and to tell before trying an iron whether it is suited to his work or will do what is claimed for it.

Constant watchfulness, however, is necessary at all times; for because of the present mode of grading iron, and the irregularity of blast furnace product in some sections, the producer of pig iron does not always deliver material of exactly uniform character, and the slightest variation of some of the ingredients may be sufficient to change entirely the nature of the castings.

The time was when manufacturers paid comparatively little attention to smaller losses that occurred in their mills and factories. Competition was not severe, and it was not considered necessary to keep a watchful eye on the innumerable small leaks through which profits escaped. It is doubtful if many of these losses were properly appreciated, and perhaps many of them were not perceived; now, however, all these things are changed. Competition in all lines of manufacturing has increased, and the narrow margins on which business must be done make the most trifling losses worthy of serious consideration. It has been well said that the word waste is rapidly becoming obsolete. Things that were formerly regarded as worthless and thrown away without a thought are now horded up with care and worked over for such pennies as can be extracted from them by improved processes of recovery. It is not uncommon to find prosperous companies thriving on what were once the waste products of a single large one. In no department of manufacturing is this more true than in the foundry; and we see many establishments in which the most rigid care and economy are exercised in all departments, but in the foundry enough is wasted to give one man a comfortable living. Here the greatest waste occurs in and about the cupola. Therefore it is very necessary that great care should be taken in the selection of the most skilful molder to obtain the best results.

A resolution of thanks to Mr. Johnson for the paper was passed unanimously.

A short and very informal discussion of the paper was joined in by the members present, and the meeting was adjourned at an early hour.

After the adjournment of the regular meeting, the members entered into a general and very interesting discussion of general foundry practices; and while very little actual business was transacted at this meeting, it was about as profitable a gathering as the Association has had—the very informality of the proceedings being rather an additional attraction. It has been the comment of attendants at the stated sessions of the long-established engineering and technical societies of the country that the "after-blow" is frequently the most profitable part of the meetings. The fact that it is unreported and unreportable begets the very freeness and easiness that loosens tongues and sets men to talking who are cautious almost to the point of silence, at the sight of the official stenographer.

MR. JOHN MCLAUCHLIN, manager of the Chicago office of the Andrews Bros. Co., with office at 808 New York Life Bldg., has just issued a circular letter to consumers of bar and sheet iron and steel, announcing the completion of the new plant of the Ohio Steel Co., of Youngstown, O., with which concern the Andrews Bros. Co. have close relations. Mr. McLauchlin also draws attention to the fact that his company is making a specialty of the higher grades of iron, such as guaranteed bridge quality and best standard guaranteed double refined B. B., and also stay bolt and horseshoe iron, box annealed sheet iron and sheet steel, etc. All of the steel made by the Andrews Bros. Co. is guaranteed to be from strictly whole billet stock.

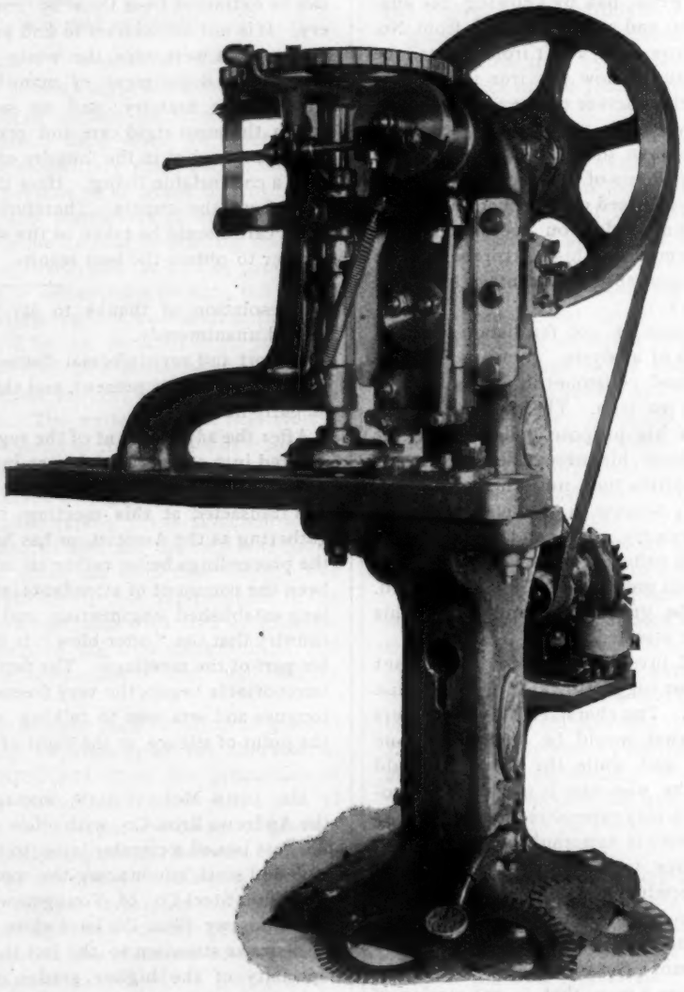
A NEW Chicago concern which will handle high grade Babbitt metal, solder, stereotype and electrotype pig lead, pig tin and ingot copper, is the Swarts Metal Co. Its office and salesroom have just been opened at 122 W. Lake st., Chicago. The company will make a specialty of the high grade Edison Babbitt Metal made by the Nassau Smelting & Refining Co., of New York, and will also handle the other products of this company. The Swarts Metal Co. has for its president Mr. S. Swarts, who has been connected for a number of years with the Swarts Iron & Metal Co., one of the largest dealers in old material and scrap in Chicago. He carries with him to the new company a ripe business experience, and with his well-known energy and push will undoubtedly make a success of it.

YOUNGSTOWN puddlers rejected the $3 proposition.

ELECTRICALLY DRIVEN MACHINE TOOLS.

There is little doubt that the near future will see a large number of the greater factories making use of electricity to an increasing extent in the running of their plants. It is probable, also, that the smaller concerns will find it advantageous to use it to a considerable extent. In several shops, machine tools are being run by electric motors attached to the tools themselves, a notable example being found in the shops of the Crocker-Wheeler Electric Co., at Ampere, N. J. This company has lately put upon the market several styles of small motors especially designed for this class of work, and two of those, attached to tools, we illustrate herewith.

One of the tools shown is a sheet metal power shear, with a one-fourth horse-power motor attached directly to the tool, geared up by belting passing over intermediate pulleys, which at the same time act as belt-tighteners by being adjusted vertically. The power required for the work is much reduced by the directness of the application. The machine can be started and stopped in an instant by the switch knob near the motor, and can be moved to any part of the shop and used at once without the troubles incident to lining up.



ONE-HALF HORSE-POWER ELECTRIC PUNCHING PRESS.

In shops already provided with a number of tools driven by belting, and where it is found desirable to introduce electric power, the motors are simply bracketed to the ordinary form of tools, and connected by means of belting. An idea of this may be had from the illustration of a one-half horse-power electric punching press. The machine shown is a special one ingeniously arranged with a dividing head or index for notching armature plates consecutively, according to the number of teeth in the index plate used.

In this connection we quote from an article by Dr. S. S. Wheeler, which appeared in the *Electrical Engineer*:

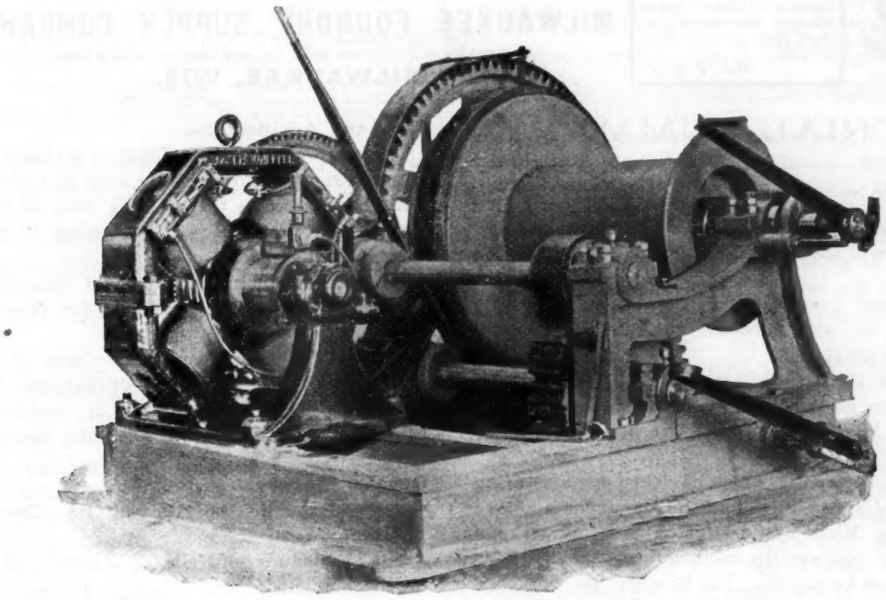
"Under the usual manufacturing conditions involving the driving of tools or machines intermittently operated, only 15 to 25 per cent of the total power supplied by the engines is expended in useful work. It is well known that a very large portion is required simply to move the great pulleys, belting and shafting, which, starting from the engine room, convey the power from floor to floor, and distribute it to the different wings and parts of the factory.

"Owing to the heavy and cumbersome nature of the system of shafting, pulleys and belting alluded to, not only does the great expenditure of power required to move these mere carriers or conveyors of power go on constantly, whether the whole factory is in operation or only the most distant part of it, but so great is the friction of the great moving mass, that no proportionate effect is felt at the cut-off of the engine by the minor and constantly occurring stoppages in the use of a large part of the individual machines, lathes, looms and tools. These single and short stoppages aggregate an enormous amount of time, and therefore of power or coal wasted. An electric system can be furnished so connected with the cut-off of the engine, so perfectly responsive and sensitive to all such changes of intermittent work, even to the most minor ones, that the amount of energy demanded from the engine is only that actually being employed in the doing of useful work.

"Any candid and fair-minded manufacturer can be shown, I think, that he will save, by a properly designed and installed electric plant, from 30 to 50 per cent of his coal bill, besides having a system greatly superior in every respect to the old one. The manufacturers of these electrical tools have given especial study to this branch of the practical application of electricity, but are very glad to be favored with the advice and suggestions of manufacturers and factory owners, many of whom have noted instances in their own experience of opportunities thus to economize in the use of power, and at the same time, by instant and close regulation of the power, to obtain a higher quality of product. But too frequently it is to be feared, electric motors and power devices have been put forward whose nature renders it impossible that they should accomplish any purpose of economy or efficiency in factories and machine shops; and the only way I know of to find out what is needed, is to study the nature of the machines and tools in familiar use. This study, I venture to believe, has been very fully entered into and enjoyed by the Crocker-Wheeler Co. in

its practical work of building motors and machinery for several years past. Without it, we should never have made these new departures; with it, we have been encouraged not only to build these motor-tools I have described, and others, but to employ them in our new works at Ampere, N. J. At those works, the lines of jack-shafting and counter-shafting, with belts and pulleys, have been replaced by copper bars from which current is tapped at any point, and the tool is at once available over a very large floor area. Where it would take, say, an hour or two to bring the work to the tool, with consequent interruption of other work, these tools can often be ranged alongside the work in five minutes. And whether moved or not, they still present the inherent features of economy and utility that I have been seeking to emphasize. It seems to me that what we have found so eminently suited to our purpose as builders of machinery, must be equally desirable in other large machine shops; and in that faith we have gone quietly to work to ascertain the best forms and to demonstrate the actual elements of saving and benefit involved. I shall avail myself of an early opportunity to return to this subject and point out some other very interesting and important features of this new class of work. The examples I have now given will suffice to demonstrate the peculiar handiness of such tools, and, I think, to win general approval for them."

The motors manufactured by the Crocker-Wheeler Co. for this class of work, are for sale in the west by Sargent & Lundy, who have an office and exhibit room in the Monadnock Building Chicago, and who will furnish details relating to motor-driven tools.



SEGREGATION IN STEEL.

At a meeting of the South Staffordshire Institute of Iron and Steel Works' Managers, Mr. Thomas Ashton, referring to segregation in steel ingots, said:

It is well known to metallurgical experts that in casting steel ingots the impurities are not uniformly distributed through the metal, but segregate and settle in some part of the ingot, causing what is locally known as pipe holes, which, as the purer metal contracts in cooling, leaves it; thus forming a cavity in which is secreted an element of weakness and danger that invariably passes unobserved through subsequent workings of the ingot, only to be discovered when, under the strain of actual work, the defective bar or plate suddenly fails, to the chagrin and loss of the user.

Mr. Alexander E. Tucker, of Birmingham, (one of our past presidents) who has devoted many years to the study of iron and steel, says in reference to this important subject: "I have known a case of segregation of impurities in which the separation was so complete that I found a kernel of metal in a large hole right in the journal of a 13-inch shaft belonging to a mine engine. The composition was—phosphorus, 0.75 per cent; sulphur, 0.34 per cent; and manganese, 1.50 per cent. I cannot account for the lump or kernel, except by supposing that the segregation went on in the usual way and was so extreme that when the ingot was under the hammer for forging, the interior had so little ductility that it developed a space, as is done in cornering a bloom under the hammer, and a part fell off into this space. Segregation may be readily demonstrated by immersing a piece of steel in acidulated water and connecting the wires from a delicate galvanometer to the different parts. The electric disturbance established by the want of uniformity in the different parts, is thus clearly shown, and if the galvanometer be delicate enough, the needle will be strongly deflected. Segregation usually occurs in that part of the ingot which freezes last and is common to all alloys. Spelter exhibits it very clearly; the lead always accumulates in the center of the slab. One of the most striking illustrations is that of cast iron. My friend, Mr. Stead, applied severe pressure to semi-solid cast iron, which analyzed 1.53 per cent phosphorus. The ejected iron, however, contained 6.84 per cent, showing the great tending of the phosphoric iron to exist separately. There is no doubt that the physical character of steel demands much more attention than it has hitherto received. I have lately been engaged in reporting on some steel tubes which were made from expensive steel, and with which no fault could be found chemically, but which during the last stage of their manufacture developed cracks. I found that it was entirely through segregation that these were caused, and had the steel been used without subsequent working, no defects would have manifested themselves; but with cold drawn tubes any want of uniformity gives of course different mechanical results, and we then have in one bar of steel, in which segregation has occurred to any considerable extent, a part of low and a part of high elastic limit, and when the two go together through the draw plate, fracture must occur.

The Tin Plate Trade on the Other Side.

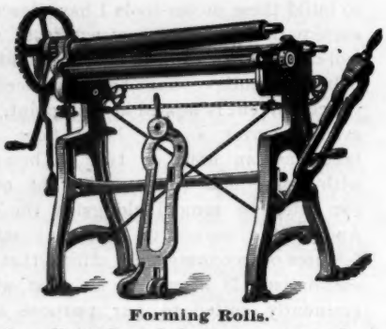
The London *Iron and Steel Trades Journal* of Jan. 19 says of the Welsh tin plate outlook: "The market for tin plates remains very dull, and the silvery lining to the very dark cloud which has overhung this important branch of industry for so long, seems now as far off as ever. It is becoming week by week more evident that American competition is a quantity to be reckoned with, and Welsh makers are hoping for some relief from an early reduction of wages, but the men seem determined not to concede more than they can possible help. There is much talk of seeking fresh markets, but Russia, Canada, Australia, France, and Eastern markets together, could keep but a very small proportion of the Welsh mills going. There is a slight downward movement in prices. Light weight wasters are in fair demand for Eastern markets. The financial position of two works in South Wales has been questioned this week, but the latest rumors are more re-assuring."

Machines for Working Sheet Metal.

Patent Gap Shears. Especially designed for Squaring, Trimming and Slitting. 6 to 18 inch throat for Slitting Wide Sheets. Complete for Tin or Iron, to 14 gauge. Seven Styles of various lengths HAND AND POWER.

General Purpose Punch and Shear. Seven Sizes.

Rear Side.



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General Purpose Forming Rolls, all sizes. Quickly adjusted and instantly opened—A Revolution. Also Patent Crimping Rolls. Beware of Infringements.

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MILWAUKEE FOUNDRY SUPPLY COMPANY,
Successors to D. Fraser Mfg. Co. and Eagle Pattern Wks.
MILWAUKEE, WIS.

INDUSTRIAL SUMMARY.

New Construction:—

It is reported that the De La Vergne Refrigerating Machine Co., of New York, will shortly build a foundry and machine shop.

The Crucible Steel Casting Co., a new concern recently formed at Canton, O., with a capital stock of $10,000, will shortly erect a new plant.

C. C. Newton & Co., of Philadelphia, will build a new machine shop for the manufacture of fine tools and machinery. The structure will be 100 by 102 feet in size, and three stories high.

The Withington-Cooley Co., which has been manufacturing a large number of agricultural implements under a prison contract at Jackson, Mich., has terminated the contract, and will erect shops and continue the manufacture of their goods on as large a scale as heretofore. The location has not been fully decided upon.

A meeting of the directors of the Birmingham Rolling Mill Co., of Birmingham, Ala., was held recently, at which it was decided to increase the capital stock of the company from $500,000 to $850,000 and to proceed immediately to the work of obtaining estimates for the erection of a steel plant, consisting of one rail mill, one structural mill, four sheet mills and a galvanizing department.

Additions, Enlargements, Removals, Etc.:—

The Beloit Iron Works, of Beloit, Wis., are considering the building of an important addition to their plant.

The Washburn & Moen Mfg. Co., will build an additional story of brick over the whole length of its mill No. 1, at Worcester, Mass., and will also erect a two-story brick extension, 41x27 feet, and 15 feet high.

For the enlargements planned by the New Castle (Pa.) Steel & Tin Plate Co., an option has been secured on lands adjoining the present plant. The project includes New York capital, as well as the participation of Norton Bros., of Chicago, who are very extensive users of tin plates. There is some talk of a stamping mill at New Castle, also, by the same interest. The contract recently made with the Morgan Engineering Co., of Alliance, O., for electric cranes, is part of the plan of the New Castle company to apply every possible economy to the production of tin plate.

Fires and Accidents:—

The iron works of Paget, Johnson & Dever, at Wabash, Ind., were destroyed by fire recently, causing a loss of $5,000.

A fire occurred in the molding shop of the Frontier Iron Works, Detroit, Mich., which resulted in a loss of $5,000; covered by insurance.

The foundry and machine shop of James Hetzel & Co., at Blairsville, Pa., was destroyed by fire recently, and will be rebuilt at the same location.

Two buildings occupied by the Gates Iron Works, at Redfield and Stein sts., Chicago, were destroyed by fire last week Friday, together with a large lot of machinery and patterns belonging to the company. The total loss was about $75,000.

General Industrial Notes:—

The rod mill of the HP Nail Co., Cleveland, started up Jan. 28.

The new foundry of Kelley & Kennedy, at Oneida, N. Y., is nearly completed.

The National Vapor Stove & Mfg. Co., of Lorain, O., capital $125,000, has been incorporated.

No. 4 blast furnace of the Pennsylvania Steel Co., at Steelton, Pa., has blown out for repairs.

The new works of the J. R. Thomas Machine Co., at Green Bay, Wis., recently started up for the first time.

The charcoal furnace of the Copake Iron Works, in Columbia Co., N. Y., will soon blow in, after lying idle for five months.

The 14 and 18-inch trains of the Albany Iron Works department of the Troy (N. Y.) Steel & Iron Co. were started up last week.

The No. 2 stack of the Thomas Iron Co., of Hokendaqua, Pa., has been abandoned by the company, and partly torn down.

The Delaware Rolling Mill, at Phillipsburgh, N. J., which has been idle since the first of last March, has been put in operation.

Conestoga furnace, at Lancaster, Pa., owned by Peacock & Thomas, is being tore down. The stack has been idle for some time.

The Riverside Iron Works, Benwood, W. Va., has been placed in operation for the first time in two years, with a full force of men.

The continued refusal of the tonnage men at the billet mill of the Illinois Steel Co., at Joliet, to accept the 25 per cent reduction proposed Jan. 1, keeps the mill idle. A large number of men are thus kept out of work.

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Proprietors of the CELEBRATED Mount Savage Fire Brick.

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A Sharon, Pa., dispatch says that the employes of the Sharon Iron Works furnace have had notice of a 10 per cent reduction in wages.

The plant of the D. M. Swain Engine Works, at Stillwater, Minn., has been leased by J. N. Bronson, who will put it in full operation.

The National Furnace Co., of DePere, Wis., owning a charcoal furnace, has stopped the manufacture of pig iron, and will go out of the business.

The billet conveyor which is being constructed for the new mill of the Johnson Co., at Lorain, O., will be capable of handling billets 4x4x48 inches.

The 9-inch and 16-inch mills, at the Lochiel Rolling Mills, Harrisburg, Pa., which have been idle since Dec. 22, have resumed with a part of a force.

Flather & Co., manufacturers of engine lathes, at Nashua, N. H., have just started up their large machine shop on full time, after an idleness of a year.

The Standard Gauge Steel Co., of Beaver Falls, Pa., has commenced the manufacture of all kinds of finished steel, including shafting, squares and angles.

The Pennsylvania Tin Plate Co. has been recently chartered at Pittsburg with a capital stock of $200,000. The company is now building a plant at Kensington.

The Missouri furnace at Carondelet, St. Louis, Mo., will be blown in very shortly, after having considerable improvements made in the 18 months it has been shut down.

The Eleanor Iron Co., a new corporation at Tyrone, Pa., will manufacture muck iron, merchant bar and skelp at its works at Hollidaysburg, Pa. The puddling department started up on Jan. 22.

The lockout at the Salem, O., wire nail mills has been compromised. The men originally refused a 20 per cent cut. The compromise also affects the mills at New Castle, Pa., and Findlay, O.

The Bethlehem Iron Co. will erect four 40-ton basic open-hearth furnaces and nine soaking-pit furnaces. A large universal mill will also be erected for them by Mackintosh, Hemphill & Co., of Pittsburg.

The report that the Carnegie Steel Co. is going into heavy ordnance manufacture is denied by Mr. Frick. Secretary Lovejoy is quoted as saying that the company has been investigating the manufacture of guns.

A Milwaukee, Wis., dispatch, Jan. 28, says: Howard P. Eells, of Cleveland, O., and John S. George, of this city, were today appointed receivers of the Bucyrus Steam Shovel & Dredge Co., of South Milwaukee, as a result of temporary embarrassment. The liabilities are placed at $259,665, and the assets at $461,841, leaving a surplus beyond the capital, which is $150,000, of $52,176.

A tin plate worker of Martin's Ferry, O., formerly connected with the Banfield plant at Irondale, O., proposes to start a mill at Toronto, O., if $15,000 is guaranteed. Schemes of this sort seem to come without any difficulty.

The billet mill of the Pennsylvania Steel Works, at Steelton, Pa., resumed Monday after an idleness of seven weeks. One stack which has been idle for a year, will be blown in during the week. All the departments of the works are running this week.

The Cleveland, Cincinnati, Chicago & St. Louis has decided upon the location for its new and extensive shops at Wabash, Ind., which are to replace the shops burned last October. Work will begin early in the spring. The shops will be much larger than the old plant, and built on a different plan.

Geo. Place Machine Co., of New York, sends to the trade a list of machinery formerly used by the Phenix Iron Works, of Trenton, N. J., and now for sale at these works. It consists of boring and turning mill, engine lathes, drills, planers, gear cutter, milling machine, cranes, anvils, steam hammers, etc.

A Johnstown, Pa., special of Jan. 27 says: The rail mill of the Johnson Co. worked day and night last week in order to use rail stock on hand. To-day the last rail passed through the rolls and laborers were set to work to tear down the machinery, which will be sent to the company's new plant at Lorain, O.

At Niles, O., Coleman-Shields Co.'s mill is n operation. The Russia mills of the Falcon Iron & Nail Co. are also running, as well as the Falcon sheet, plate and puddle mills. The tin mill is also to start within a week, giving employment to 300 men and paying the compromise wage scale agreed upon at Pittsburg.

The plant, machinery, tools, materials and patents of Morris Sellers & Co., manufacturers of railroad supplies in Chicago, will be sold by the receiver of the company, Mr. George O. Manchester, at public sale, in the court room of Judge Payne, in the Court House, Chicago, at 10 A. M., on Saturday, Feb. 2, 1895.

To satisfy a judgment obtained by the Garrison Foundry Co., of Pittsburg, the sheet mill of Summers Bros. & Co., at Struthers, O., was sold Jan. 26 to the executors of the estate of Thomas Struthers, who were the only bidders, for $6,350. A company is being formed to purchase the plant. It has been idle since the death of Samuel Summers last year.

The foundry plant of the Bush Hill Iron Works, at Philadelphia has recently been purchased by a syndicate of capitalists, who will operate it under the name of the Philadelphia Roll

& Machine Works. A new lot of machinery will be purchased, and the plant made one of the finest roll works in the country. It will be under the management of Mr. David Townsend.

The Berlin Iron Bridge Co. has closed its purchasing agent's office in Philadelphia, and hereafter all purchases will be made from the office of the company at East Berlin, Conn. W. E. Stearns, who lately occupied the position of purchasing agent, has severed his connection with the company and accepted an important position with the Pennsylvania Steel Co.

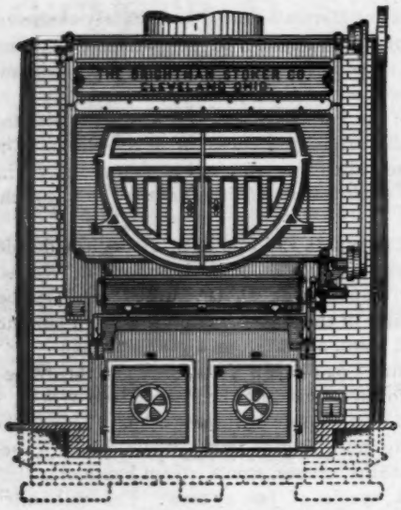
The Prentiss Tool & Supply Co. have on hand at their salesrooms, 115 Liberty street, New York, a number of bargains in second-hand metal working machinery, all first-class, high-grade tools, many of which have never been used. All of them are as complete as when they left the factory, and many have chucks, tools and special attachments. Prices and description will be furnished upon application.

A large variety of metallic and brass pattern letters and figures is made by H. W. Knight & Son, Seneca Falls, N. Y. They have just completed a large contract for brass letters, and are frequently shipping to foreign ports. These brass letters are made for soldering on metal patterns, and they fill a long felt want. The trade of the above firm is constantly increasing, which speaks well for their goods. Their price lists and discounts may be had by addressing drawer 1126, Seneca Falls.

Only an expert can judge of the comparative excellence of tin roofing plate, fresh from the manufactory, and even an expert may be deceived by the outward appearance, as the defects of material are not manifested until it has been subjected to actual wear. Architects, roofers and builders should specify or employ such brands as have stood the test of time and service, and whose high and uniform excellence is maintained in the face of the competition of inferior products. N. & G. Taylor Co., of Philadelphia, manufacturers of the Taylor Old Style brands of American roofing tin, state that they have never been tempted by the competition of other manufacturers to sacrifice quality to price. Their product is heavily coated and great care is exercised in selecting material and in the process of coating and re coating.

It is reported that 20 new locomotives are to be built in the Pennsylvania shops at Altoona, this year, for the Southwest system. Car building is reported as follows: The Unadilla Valley has contracted with the Carlisle Mfg. Co., of Carlisle, Pa., for 10 freight cars. The Boston & Maine's proposed contract is for 23 passenger and baggage cars. The Lebanon Mfg. Co. has secured orders from the Illinois Steel Co., of Chicago, and from the George's Creek & Cumberland Railroad Co. Sixty heavy logging cars are to be built by the Wisconsin Central.

The Georgia Mining, Manufacturing & Invesment Co., with property valued at $3,000,000 went into the hands of a receiver, Julius L. Brown, its president, on Jan. 24, at Atlanta. The company controls the Dade Coal Co., Walker Coal & Iron Co., Georgia Iron & Coal Co., Chattanooga Iron Co., Barlow Iron & Manganese Co., and Castle Rock Co., all operating coal and iron mines in North Georgia. The bulk of stock is owned by the estate of Joseph E. Brown. Depression in the iron trade, and in general business, cut off profits. The liabilities are between $750,000 and $800,000. The company was lessee of the Chattanooga Iron Co.'s furnace at Chattanooga and of the Rising Fawn furnace of the Walker Coal & Iron Co., at Rising Fawn, Ga. These stacks have both been out of blast for some time.



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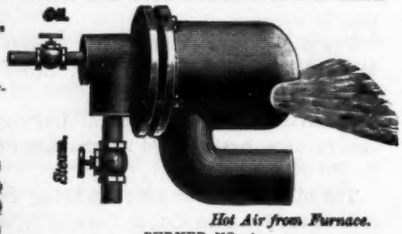

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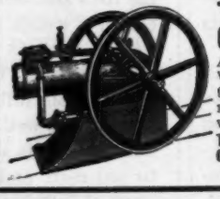

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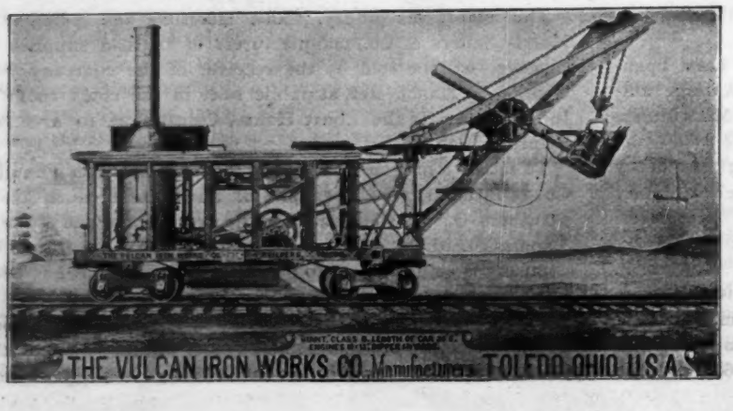

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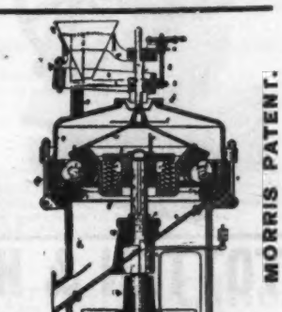
GENTLEMEN: We purchased a No. 2 American Rock Breaker and a No. 2 American Ball Pulverizer from your company about one year ago. The latter part of April, 1893, we started up for regular work, since which time we have run both of said machines to the full extent of our demands and to our entire satisfaction. The first 700 tons of hard iron ore that we pulverized for paint purposes was ground without taking the Pulverizer apart, and without expending one dollar for repairs for either of these machines. Of the 700 tons spoken of, about 200 tons was Lake Superior Specular iron ore, containing some 70 per cent. iron; a very difficult ore to pulverize. The remainder was a red fossiliferous iron ore, carrying quite a per cent. of silex, which cuts out buhr-stones rapidly. We find that the steel balls, which were when new 3 in. in diameter, now caliper 4⅞ in., and are perfectly round and smooth. The grinding track shows very little wear, and the driving track shows LESS; in fact, the wear is almost imperceptible. These two machines crush and pulverize more than one ton per hour with LESS than 12 H. P. We do not know of any Crusher or Pulverizer that can compare with the output of these two machines in quantity, quality, small amount of wear and tear, and like power. In our opinion, you cannot recommend them too highly. Very truly yours,

CLEVELAND IRON ORE PAINT CO.



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Envelope Holder and Paper Guides. Readily adjustable to any part of cylinder, facilitating work with narrow paper or on envelopes

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Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tan-bark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

A number of new factories have been induced to locate—largely through the instrumentality of this company—at towns on its lines. The central position of the States traversed by the Chicago, Milwaukee & St. Paul Railway, makes it possible to command all the markets of the United States. The trend of manufacturing is Westward. Nothing should delay enterprising manufacturers from investigating. Confidential inquiries are treated as such. The information furnished a particular industry is reliable.

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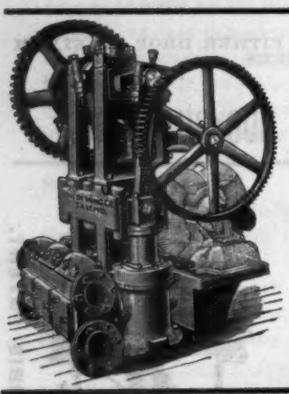

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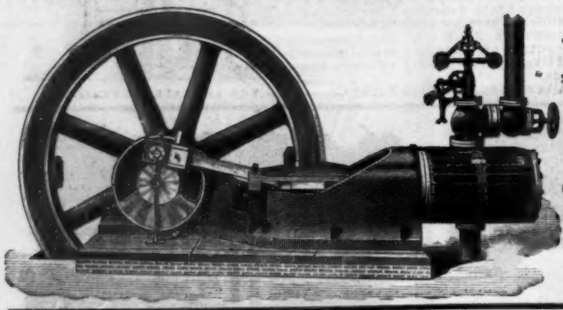

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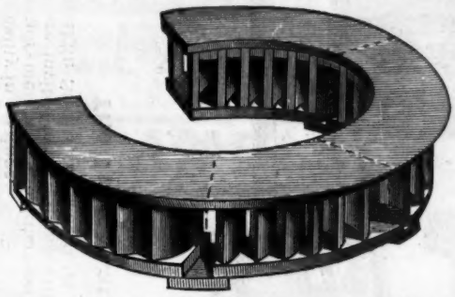

Fig. 1—The Combination of Sections of Tuyeres as placed in wall.

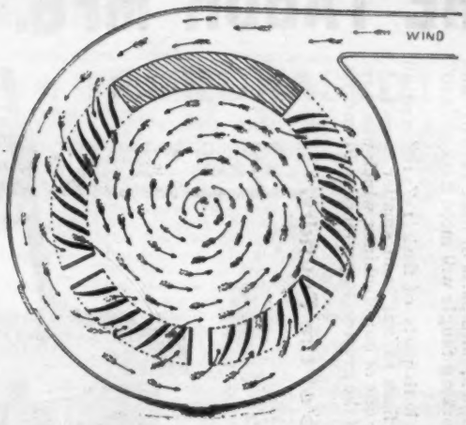

Fig. 2—Showing direction of Wind through the Curved Tuyeres.

ADOPTED BY U. S. NAVY DEPARTMENT.

Upon the manner of introducing the blast into the cupola depends the degree of combustion attained, consequently that form of tuyeres which will produce maximum results at a minimum cost is the great desideratum. We assert that this has been reached in the "Blakeney" tuyeres to a higher and more satisfactory degree than in any other device known, whether it be a combination of upper and lower tuyeres, a series of pipes, or the old-fashioned tuyeres; and we are certain that a little reflection on the part of any one familiar with cupola practice, will convince him that the projection of the blast through CURVED tuyeres will not only insure its penetration nearer to the center of the cupola, but its more even distribution to all parts of the cupola as well. It is upon this self-evident fact that we base our claim of the attainment of a combustion more nearly approaching perfection than by any other method. With better combustion it necessarily follows that there must be greater economy of fuel, faster melting, less "hanging up," and the production of a more uniform grade and strength of iron. In a word, the "Blakeney" cupola is a continual source of profit and satisfaction in a foundry, and to any one desirous of improving their melting facilities, or who are in the market for a new cupola, we shall be pleased to send a descriptive catalogue. We are quoting "hard time" prices and solicit the privilege of submitting figures. To those whose cupolas are being run at a daily loss as compared with the results attained in the "Blakeney," we desire to state that we are prepared to apply these patent tuyeres and air-chamber to old cupolas at a nominal cost when the shell is in good condition.

A FEW "STRAWS" SHOWING THE WAY THE BLAKENEY CUPOLA "WIND" BLOWS.

LANCASTER, PA., August 29th, 1894.

The Springfield Cupola Co., Springfield, Ohio.

GENTLEMEN: In answer to yours of the 27th inst. regarding the working of the Blakeney Cupola purchased from you in January last, we are pleased to state that since getting the Cupola in operation we have been in receipt of a number of inquiries from interested parties, and our reply has invariably been to the effect that the Cupola is giving us entire satisfaction. We never handled one that melts iron so rapidly, and for rapid work and satisfactory results with the castings we can cheerfully recommend it. Yours truly, THE HUBLEY MANF'G CO., F. H. Steacy, Sec'y.

FULTON, ILL., Aug. 29, 1894.

The Springfield Cupola Co., Springfield, Ohio.

GENTLEMEN: Replying to your favor of recent date we would say that it affords us pleasure to state that the No. 4 Blakeney Cupola bought of you last November is giving us just as good satisfaction as the Blakeney we had in use for fifteen years in our works at Tiffin, O. During this time we were familiar with cupolas of other makes, but knew of none which could give the good results attained in yours, consequently when we removed our plant to this city, and were in the market for a new cupola, we immediately communicated with you for the purchase of a new Blakeney. You may refer to us whenever the opportunity offers. Yours truly, THE MISSISSIPPI VALLEY STOVE CO.

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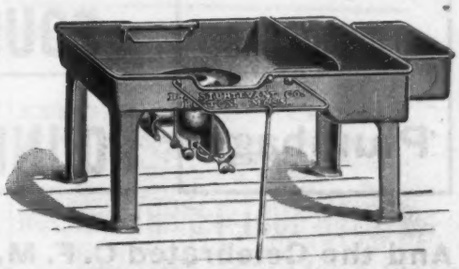

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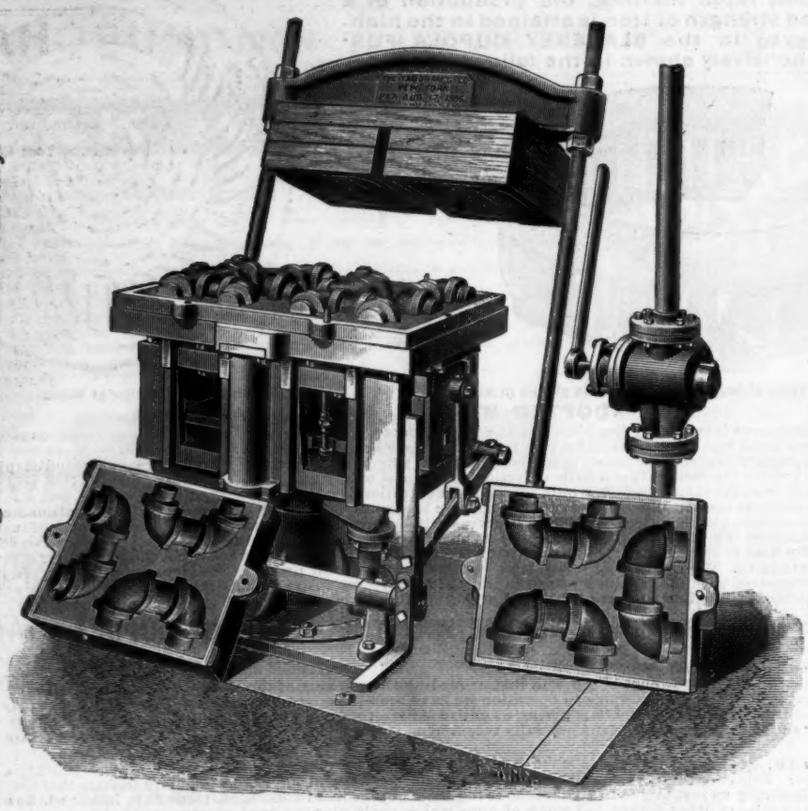

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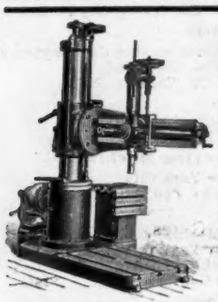

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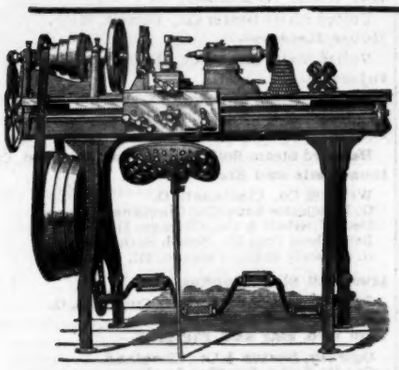

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Injectors—
Ed. Wertheim, Chicago.
C. H. Besly & Co., Chicago, Ill.

Insurance Companies—
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Iron Nails and Steel—
Weber & Co., Cincinnati, O.
G. B. Schulte Sons Co., Cincinnati, O.
Geo. H. Sibell & Co., Chicago, Ill.
Bethlehem Iron Co., South Bethlehem, Pa.
C. H. Besly & Co., Chicago, Ill.

Iron and Steel Roofing—
Sykes Iron & Steel Roofing Co., Niles, O.
Berger Mfg. Co., Canton, O.

Iron Ore, Bar and Pig Iron—
Oglebay, Norton & Co., Cleveland.
Condit-Fuller Co., Cleveland.
E. C. Pope, Cleveland.
Geo. H. Sibell & Co., Chicago, Ill.
Forster, Hawes & Co., Chicago, Ill.

Iron Working Tools—
John Adt & Son, New Haven, Conn.
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Cleveland Twist Drill Co., Cleveland, O.
Prentiss Tool & Supply Co., Chicago, Ill.
Toledo Machine & Tool Co., Toledo, O.
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Hill, Clarke & Co., Chicago, Ill.
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Fox Machine Co., Grand Rapids, Mich.
Lodge & Shipley Machine Tool Co., Cincinnati.
Manufacturers' Tool Supply Co., Chicago.
W. H. Holmes & Co., Chicago, Ill.
C. H. Besly & Co., Chicago, Ill.

Link Belting—
The Jeffrey Mfg. Co., Columbus, O.

Lathes—
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Bickford Drill & Tool Co., Cincinnati, O.
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New York Machinery Depot, 178 Broadway, New York City.
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Gouverneur Machine Co., Gouverneur, N. Y.
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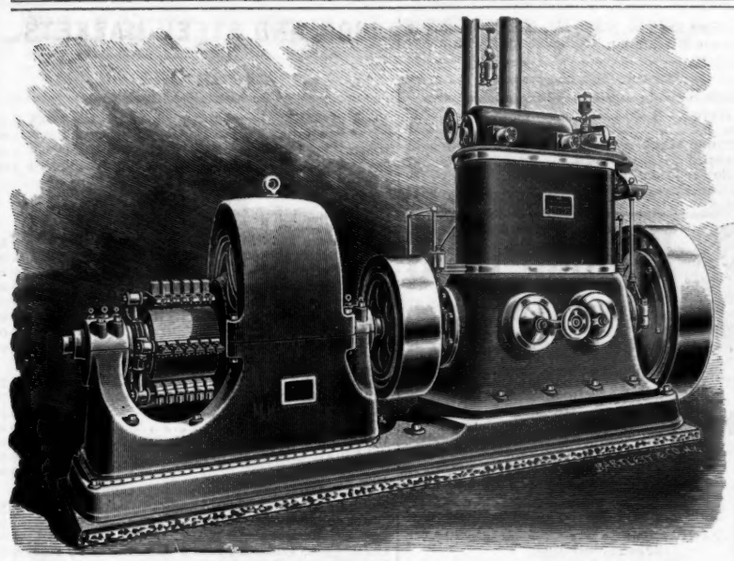

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The star (*) indicates that the adv. appears alternate weeks; the dagger (†) once a month; the double dagger (‡) once in three weeks; the parallel (‖) three times out of four.

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No. 2 Gray Forge, neutral	9 00@ 00 00
No. 1 American Scotch	11 25@ 00 00
No. 2 American Scotch	10 25@ 00 00
Lake Superior Charcoal	12 50@ 13 00
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No. 1 Foundry	$11 25@$11 75
No. 2 Foundry	10 25@ 10 75
Gray Forge	9 50@ 9 75
White and Mottled	9 00@ 9 25
Warm Blast Charcoal	18 00@ 19 00
Cold Blast Charcoal	22 00@ 26 00
Bessemer	10 65@ 00 00
CHICAGO (reported by our representative:)	
Lake Superior Charcoal	$13 00@$13 50
Local Coke Foundry No. 1	10 25@ 10 50
Local Coke Foundry No. 2	9 75@ 10 00
Local Coke Foundry No. 3	9 40@ 9 65
Local Scotch Foundry No. 1	10 25@ 10 50
Local Scotch Foundry No. 2	9 75@ 10 00
Local Scotch Foundry No. 3	9 50@ 9 75
Southern Coke No. 1	11 00@ 11 25
Southern Coke No. 2	10 25@ 10 50
Southern Coke No. 3	10 00@ 10 25
Southern No. 1 Soft	10 25@ 10 50
Southern No. 2 Soft	10 75@ 10 25
Southern Silveries No. 1	11 50@ 11 75
Southern Silveries No. 2	11 25@ 11 50
Jackson Co. Silveries	15 50@ 16 00
Ohio Silveries No. 1	14 00@ 14 50
Ohio Silveries No. 2	13 00@ 13 50
Ohio Strong Softeners	12 50@ 13 00
Alabama Car Wheel	17 50@ 18 00
Malleable Bessemer	11 00@ 11 50
Coke Bessemer	11 00@ 11 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$ 9 75@$10 00
Southern Coke No. 2 and No. 1 Soft	9 25@ 9 50
Hanging Rock Coke, No 1	12 00@ 12 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 55
Jackson County Stone Coal No 1	14 50@ 15 00
Southern Coke, Gry Forge	8 50@ 8 00
" " Mottled	8 25@ 8 75
Standard Alabama Car Wheel	15 75@ 16 50
Tennessee " "	15 50@ 16 70
Lake Superior " "	14 00@ 14 05
BUFFALO (reported by Rogers, Brown & Co.)	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$11 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	10 75
Ohio Softener No. 1	11 75
Jackson Co. Silvery No. 1	15 75
Lake Superior Charcoal	13 75
Southern Soft No. 1	11 25
Hanging Rock Charcoal	18 50
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Southern Coke No. 2	10 00@ 10 25
Southern Coke No. 3	9 75@ 10 00
Southern Gray Forge	9 50@ 9 75
Southern Charcoal No. 1	14 00@ 14 50
Missouri Charcoal No. 1	12 50@ 13 00
Ohio Softeners	14 00@ 14 50
Lake Superior	15 50@ 16 00
Southern	16 75@ 17 00
Connellsville Coke, St. Louis	4 50

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Old steel rails	10 00
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No. 1 wrought scrap	8 50
No. 1 Machine cast scrap	8 50
Iron axles	15 50
Axle turnings	8 00
Wrought turnings (free from cast)	6 50
Cast borings	5 50
Uncut wrought iron boilers	4 00
Steel boiler plates	8 00
Grate bars	5 50
Pipes and flues (clean)	7 00
Tank iron	6 75
Hoop and band iron	6 00
Sheet iron	5 00
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Beams and Channels (f. o. b. mill)	1.25c@1.35c
Angles	1.20c@1.25c
Tees	1.35c@1.45c
Universal Plates	1.20c
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[List prices out of store.]

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1½ to 4 by ⅜ to 1 inch	1 30
1½ to 6 by ⅜ to 1 inch	1 35
1½ to 6 by 1⅛ to 2 inch	1 50
1¼ & 1¾ by ⅜ to ¾ inch	1 35
1 & 1¼ by ⅜ to ¾ inch	1 40
⅝, ¾, ⅞, by ⅜ to ⅞ inch	1 50

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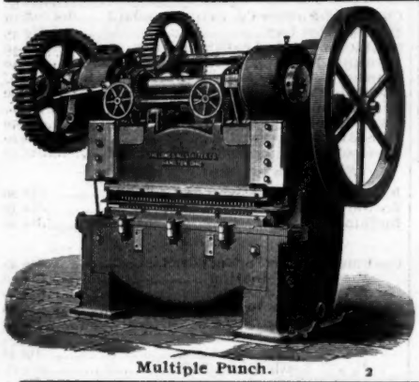
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1 to 1⅞ inch	1 30
2 to 2¾ inch	1 40
2¾ to 3¾ inch	1 55
3⅜ to 4 inch	1 80
4¼ to 4½ inch	2 40
4¾ to 5 inch	2 60

Oval.

⅜ to 1¼ inch	1 50
⅜ to ¾ inch	1 50
½	1 70
⅝	1 90

Half Oval and Half Round.

1¼ to 3 inch	1 85
⅜ to 1½ inch	1 65
⅜ to ¾ inch	1 90
¼	2 05
⅜	3 15

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 40
1 to 1¾ by ¼ and 5-16 inch	1 45
¾ to ⅞ by ¼ and 5-16 inch	1 55
½ to ¾ by ¼ and 5-16 inch	1 80

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1 7-16 to 4, No. 13, 14, 15 and 16	1 85
1 7-16 to 2, No. 17, 18 and 19	1 90
1 7-16 to 2, No. 20	2 00
1 7-16 to 2, No. 21	2 10
1 7-16 to 2, No. 22	2 20
1⅛ to 1⅜, No. 13, 14 and 15	1 90
1⅛ to 1⅜, No. 16, 17 and 18	1 95
1⅛ to 1⅜, No 19 and 20	2 00
1⅛ to 1⅜, No. 21	2 10
1⅛ to 1⅜, No. 22	2 20
15-16 and 1 inch, No. 13, 14 and 15	1 85
15-16 and 1 inch, No. 16, 17 and 18	2 00
15-16 and 1 inch, No. 19 and 20	2 10
15-16 and 1 inch, No. 21	2 20
15-16 and 1 inch, No. 22	2 30
⅞, No. 13, 14 and 15	2 10
⅞, No. 16, 17 and 18	2 20
⅞, No. 19 and 20	2 30
⅞, No. 21	2 40
⅞, No. 22	2 50
13-16, No. 13, 14 and 15	2 20
13-16, No. 16, 17 and 18	2 30
13-16, No. 19 and 20	2 40
13-16, No. 21	2 50
13-16, No. 22	2 60
¾, No. 13, 14 and 15	2 30
¾, No. 16, 17 and 18	2 45
¾, No. 19 and 20	2 55
¾, No. 21	2 65
¾, No. 22	2 75
11-16, No. 13, 14 and 15	2 55
11-16, No. 16, 17 and 18	2 60
11-16, No. 19 and 20	2 70
11-16, No. 21	2 80
11-16, No. 22	2 90
11-16, No. 23	3 00
⅝, No. 13, 14 and 15	2 60
⅝, No. 16, 17 and 18	2 70
⅝, No. 19 and 20	2 80
⅝, No. 21	2 90
⅝, No. 22	3 00
⅝, No. 23	3 10
9-16, No. 13, 14 and 15	2 80
9-16, No. 16, 17 and 18	2 90
9-16, No. and 20	3 00
9-16, No. 21	3 10
9-16, No. 22	3 20
9-16, No. 23	3 30
7-16 and ½ inch, No. 13, 14 and 15	3 00
7-16 and ½ inch, No. 16, 17 and 18	3 10
7-16 and ½ inch, No. 19 and 20	3 20
7-16 and ½ inch, No. 21	3 30
7-16 and ½ inch, No. 22	3 40
7-16 and ½ inch, No. 23	3 50
⅜, No. 13, 14 and 15	3 50
⅜, No. 16, 17 and 18	3 60
⅜, No. 19 and 20	3 70
⅜, No. 21	4 00
⅜, No. 22	4 10
⅜, No. 23	4 25

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 60
1¼ to 6 by Nos. 11 and 12	1 65
1 to 1¾ by ⅛ to 3-16 inch	1 65
1 to 1¾ by Nos. 11 and 12	1 70
⅞ and 13-16 by ⅛ to 3-16 inch	1 80
⅞ and 13-16 by Nos. 11 and 12	1 85
¾ and 11-16 by ⅛ to 3-16 inch	1 90
¾ and 11-16 by Nos. 11 and 12	1 95
⅝ and 9-16 by ⅛ to 3-16 inch	2 05
⅝ and 9-16 by Nos. 11 and 12	2 10
½ by ⅜ to 3-16 inch	2 20
½ by Nos. 11 and 12	2 25

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	1 80
⅝ inch, " " " " 13 and 14	1 90
¾ inch, " " " " 11 and 12	1 95
¾ inch, " " " " 13 and 14	2 15

Sheet Iron.

No. 10	1 85
No. 12	1 90
No. 14	1 95
No. 15-17	2 05
No. 18	2 20
No. 20	2 30
No. 22-24	2 40
No. 25-26	2 50
No. 27	2 60

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 60
Shell	1 85
Flange	2 10
Marine Flange	2 35
Fire Box	3 35

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½

THE ADAMS
WATER TUBE BOILER.

This Boiler is absolutely safe from explosion. Gives as much steam from the waste heat as any boiler made. Easy of access for cleaning and repairs. Furnishes perfectly dry steam. Occupies little ground space. Economical in first cost. Send for complete circulars giving list of users and testimonials, one of which is printed below.

The Falcon Tin Plate & Sheet Co.,
NILES, O., Aug. 18, 1893.

Chas. P. Adams, Esq.

Dear Sir: The three boilers of 225 H. P. each which you furnished us are working in every way satisfactory. We consider them as good steamers as any we have ever used. Up to the present time have spent nothing on them for repairs. Very respectfully,

THE FALCON TIN PLATE & SHEET CO.,
By Warner Arms, Pres't.

C. P. ADAMS.
807 The Cuyahoga, - CLEVELAND. O.

C. W. HUNT COMPANY,
45 Broadway, New York,

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HOISTING AND CONVEYING MACHINERY

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INDUSTRIAL RAILWAYS.

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Galvanizing in all its branches, and Manufacturers of Rubber Buckets for chain pumps.
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Standard Tubular, Fire Box, Vertical and Submerged Tube Steel

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For Stationary, Portable, or Marine use.

Also of TANKS of all kinds.
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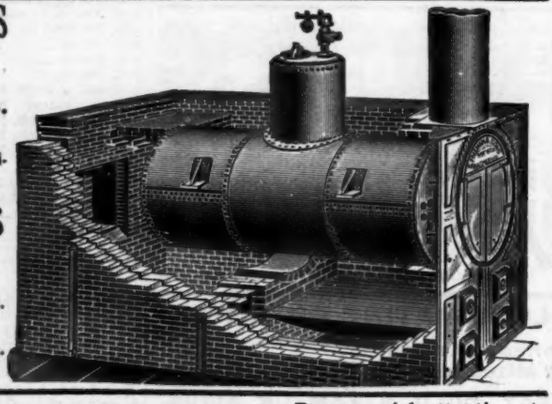
Grey Iron Castings.

Write for Prices and Terms.



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COLLECTS NO MOISTURE FROM UNDER SIDE. NO DRIPPINGS.

Resists acids and gases arising from inside of FOUNDRIES, IRON WORKS, MILLS, ETC.

Litho-Carbon Paint for Metal Roof sand Sidings Bridges, Smokestacks, etc., covers more space than any other Paint; dries quick, won't crack, peel or blister; will stand a heat of 550° Fahrenheit. Send for 32-page catalogue.

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THE UPSON NUT CO., Manufacturers of Nuts, Washers, Carriage, Machine, Plow and Elevator Bolts, Coach Screws, etc.

Steel Stamps and Stencils.

FLEHARTY, J. H. & Co., Rubber Stamps, Seals, Stencils, Automatic Check Punches and Numbering Machines. 92 Seneca St.

7-16 to ⅝ and 2¾ to 3 in.	.09
3⅛ to 4 in.	.09½
⅝ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10¼
¼ to 9-32 and 6¼ to 7 in.	.11
16 in	.13

Flats.

	cts. lbs.
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Machinery	base price,	1 80
Tire	"	1 85
Spring	"	2 20
Sleigh Shoe	"	2 20
Toe Calk	"	2 05
Cutter Shoes, tapered and bent	"	2 45

English Tool Steel.

Jessop's	.15½c
Hobson's "Best"	.15½c
" "Choice"	.35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	.3 70
Bridge ½, ⅝, 11-16 and ¾ inch diam	.3 40

MACHINERY SUPPLY MARKET.

Anvils.

American	₩ lb 9@10
Wright's	₩ lb 12

Bellows.

Blacksmiths'	Hill's	dis 40
	Bullock's	dis 50&10
Moulders'		dis 40@40&10
Hand		dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis 45

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 35
Horton's Universal	dis 40
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3½
Iron, steel points	₩ lb 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1½"	dis 50&10
Morse Taper and Straight Shank Larger than 1½"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F F. FF.
Kegs, ₩ lb	4½c	5 c	2½c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	5 c
10 lb cans less than 10..10	c	10 c	7¼c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70

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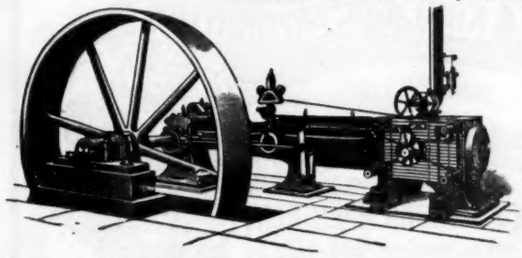
CINCINNATI, OHIO.



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* Daily. † Daily, except Sunday.

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Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	†12:45 pm	*12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

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Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn.	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	††11:00 A M
Wooster	.....	*6:30 P M
Akron, Canton & Marietta	†2:45 P M	††11:00 A M
Steubenville, Wheeling, Washington, D. C., and Baltimore	†2:45 P M	††11:00 A M

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NEW

Shop-worn machinery is not worth so much to us for our show rooms as if it were bright and fresh.

But there's **no difference** in the **work** it can do.

We have several new, standard, shop-worn machine tools, in our store for a year or so, that we wish to sell to make room for bright samples.

Will you take one, if we make the **price right?**

Send for descriptive list.

HILL, CLARKE & CO.,

Machinery Merchants,

156 Oliver St., 12 and 14 N. Canal St.,

BOSTON. CHICAGO.

A growing circulation among machine shop and foundry firms, has

THE IRON TRADE REVIEW.

Western.....dis 70
Stub's.....dis 25
Grobet's.....dis 30
Reynolds Bros.' Hand Cut.....dis 50
Industry File Works Hand Cut.....dis 50

Hammers.

P. S. W.....dis 40
Atha new list, Jan. 15, 1887.....dis 50
Heavy hammers and sledges under 5 lbs.....12c
" " " " over 5 lbs.....10c

Jack Screws.

Illinois Bolt Co. list.....dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15½	11½	8½	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887.....dis 85
Standard Penny Nails, ₩ keg card rate
Car lots.....$1.10
Less than car lots.....$1.25

Oilers.

Zinc and Tin.....dis 60
Brass and Copper.....dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz.....dis 10@10&10

Packing, Steam.

Boston Belting Co.....dis 60
American Packing Hemp.....₩ lb 9@10
Russia " " .....₩ lb 14
Italian " " .....₩ lb 13@19
Plumbago Piston.....₩ lb 40
Peerless.....₩ lb 60
Morrison's " .....₩ lb 45
Square Flax " .....₩ lb 50
Sheet Rubber.....₩ lb 12&24
Excelsior Rubber.....₩ lb 48
Rainbow.....Full Rolls.....45c ₩ lb; Less than Full Rolls. 50c ₩ lb
Eclipse Gasket.....₩ lb 75

Picks.

Railroads, 5 to 6 lbs.....$12 dis 60
" 6 to 7 lbs.....$13 dis 60

Pulleys.

Iron Pulleys, Walker List.....dis 50
Medart Pulleys.....dis 50
Split Wood Pulleys.....dis 55@60

Rivets.

Iron, Thousand, list November 17, 1887 dis 50&10@60
Iron, Ordinary, Cooper's Block and Carriage list November 17, 1887.....dis 50&10@60
Copper.....dis 50@50&10

Saws.

Disston's Circular.....dis 40&10
" Band.....dis 25
" Scroll.....Net
Hack Saw Stubs.....dis 20
" " Eureka.....dis 20
" " Star.....dis 20
Saw Swages Diston's.....dis 30
Atkins' Circular Saws.....dis 40&45
" Mill, Mulay and Drag Saws.....dis 40&10
" Wood Saws.....dis 40&10
" Silver Steel Diamond Cross-cut Saws.....70c per ft
" Dexter Cross-cuts.....50c "
" Diamond " .....30c "
" Tuttle Tooth Cross-cuts.....25c "
" One-man Cross-cuts.....32c "
No. 1 Handles.....23c per pair
No. 6 " .....16c "
Excelsior Saw Tools.....$6 per doz
Derfection " .....$15 "
Petroit Saw Works, Circular.....dis 50
" " " Band.....dis 25
" " " Mulay.....dis 45

Taps.

Cards, Hand and Nut to 2 in.....dis 50
Carpenters' " " " .....dis 50
Morse " " " .....dis 50
Pratt & Whitney " " new list.....dis 10
Machine Screw Taps.....dis 55
Pipe Taps to 2½ in.....dis 70
Stay Bolt Taps.....dis 25
Stove Bolt Taps.....dis 55
Pulley Taps.....dis 40

Vises.

Solid Box.....dis 60
Parker's.....dis 20@25
Prentiss.....dis 20
Stephen's.....dis 25@30
Barrett's.....dis 30
Miller's Falls.....dis 40
Merrill's.....dis 15@20
Howard.....dis 35

Wire.

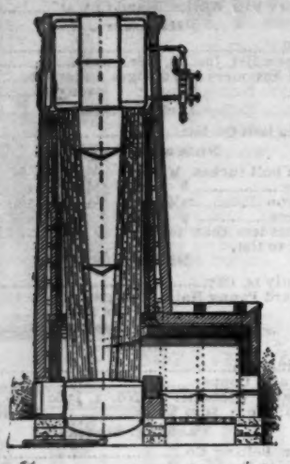
New List, Apr. 9, 1894

Brass.....dis 40
Copper.....dis 40
Bright and annealed, Nos. 0@18.....dis 70&10@75
" " Nos. 19@26.....dis 75@75& 5
" " Nos. 27@36.....dis 75&10& 5
Coppered Nos. 0 to 18, market list.....dis 70@70& 5
Galvanized Nos. 0 to 18 " " .....dis65& 5
Tinned market Nos. 0 to 18.....dis 67½
Cast steel.....dis 50
Tinned Broom Wire.....dis 70&5@70&10
Annealed Fence, Nos. 8 and 9.....dis 75
Annealed Grape, Nos. 10 to 14.....dis 75
Stub's Steel Wire regular.....95c ₩ lb dis 30

Wrenches.

Coe's genuine.....dis 50
Girard Standard.....dis 70&10
Agricultural.....dis 75&10
Mechanic's.....dis 55&10& 5
Bemis & Call's Combination.....dis 35
Donohue's Engineers.....dis 20&10
Lamson & Sessions Engineers.....dis 60
Billings & Spencer's Drop Forged.....dis 25
William's " " .....dis 25
Alligator " " .....dis 40

"CAHALL"



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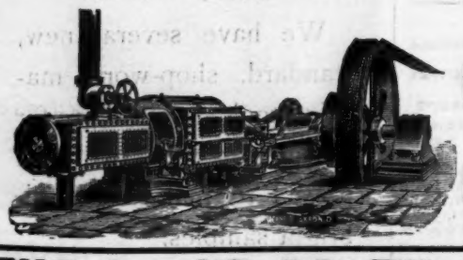

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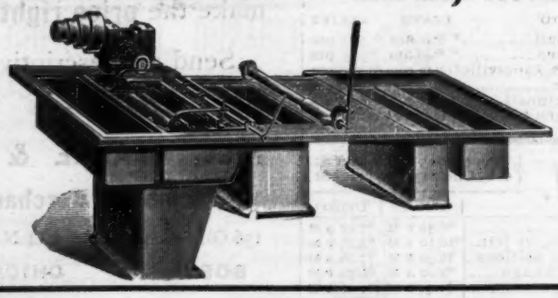

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No Steam, Coal, Ash, Gauges, Engineer nor Danger.

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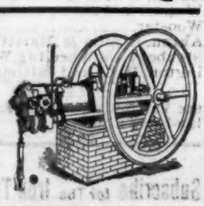

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S. [illegible] York, 42 S. Water St., Cleveland Agent.

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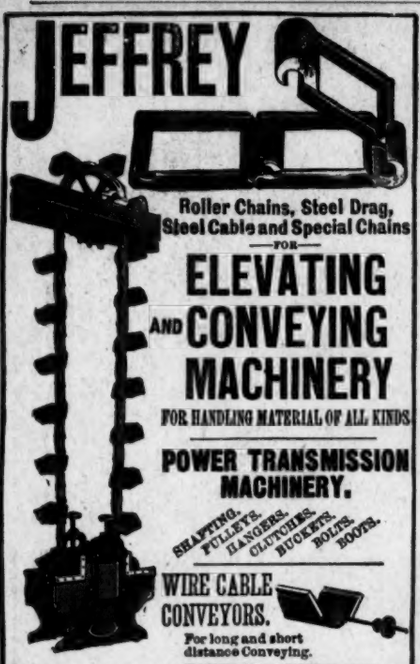

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For long and short distance Conveying.

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STEEL RAILS.
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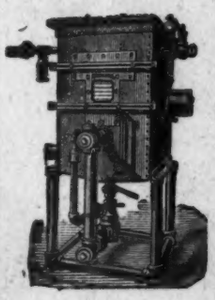

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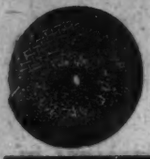

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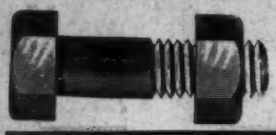

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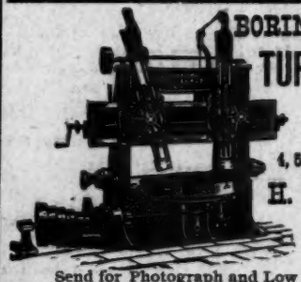

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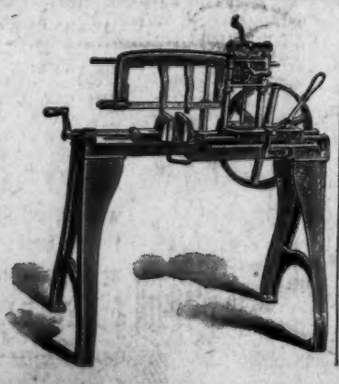

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